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AMERICAN JOURNAL OF PUBLIC HEALTH

INSURANCE COMPANIES AND PUBLIC HEALTH ACTIVITIES.

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Read before the Sociological Section, American Public Health Association, Colorado Springs, September, 1913.

It should not be amiss at a meeting of the Sociological Section of the American Public Health Association to use as a text for an address on the subject of "Insurance Companies and Public Health Activities," the sociological dictum of a writer who, while a great sociologist, has not been universally recognized as such. In order that you may not be kept longer in suspense, let me say that I refer to George Ade, the well-known author of "Fables in Slang," who, in his inimitable satire on the amateur philanthropist entitled "The Good Fairy with the Lorgnette," concludes with the moral "In uplifting, get underneath." I believe this literary gem of four words should be treasured by social workers and sociologists, whether they be philanthropists, health officers, insurance agents or what not.

It may not be an exaggeration to say that the world is at present "health mad." The discoveries of the past twenty-five years in medical science have been startling and revolutionary. Humanity, after centuries of acquaintance, had become fairly familiar with the common and ordinary dangers of life and limb, and in part they had lost their early terrors. Hardly had we moderns adjusted ourselves to accept these visitations with equanimity, when there came a host of pathologists and bacteriologists and kindred spirits to startle us out of our hardly acquired contentment. We were told that external terrors were trivial compared to those of internal origin. Germ after germ was held before our astonished eyes, magnified in the ratio of our fears. We had become accustomed to the belief that night air was bad and in large quantities might be fatal; that tuberculosis and insanity proved the correctness of Deuteronomy, that the sins of the parents

would be visited on the children; that children might as well have infantile diseases early in their careers since they must and would have them sooner or later. Who among us doubted that a cold was something tangible which was really caught, and that the best cure was either to abstain from food or to eat plentifully—the old-time doctor was undecided as to which of these methods was best. And when old age came, like the deacon's one-horse shay we simply "wore out." There was no talk of phagocytosis or arteriosclerosis. Such vulgar words were not in our vocabulary. We softened and toned down "old age", since it was inevitable, and made it as far as possible a thing of beauty. "Rivers of life" and "fountains of youth" were probably never expected to accomplish more than the proverbial "three score and ten." Men were concerned less about the causes of death than they were about what might happen after death.

All these beautiful myths and fallacies, these world-old beliefs in inaccuracies, disappeared with the entrance of the bacillus on the scientific stage. Today, divested as we are of our old superstitions, of our faiths in our old traditions, we stand in the beating rays of the new light in scientific discovery—otherwise and prosaically called the "germ theory." Most of us are blinded and dazzled and, paradoxical as it may seem, are groping even more blindly than we did in the dark.

Let us drop metaphor and endeavor to bring out what we mean in Anglo-Saxon English. The facts are these: the great mass of the common people is still unacquainted, excepting in a rudimentary way, with the wonderful discoveries in medical science during the past few decades. Such knowledge as has been imparted to thousands and hundreds of thousands exemplifies Pope's adage that "A little learning is a dangerous thing." The germ theory of disease is involved and but little understood, or more likely misunderstood, excepting by specialists whose life work has been the study of the remarkable phenomena which go on daily in the human organism.

Interpretations of studies made by these specialists may be found in medical magazines and periodicals. These, however, are too technical and abstruse for the layman. The public generally does not understand the *raison d'être* for much of our modern health campaign. Recent discoveries are not always presented so as to be intelligible. But few of the medical profession have as yet translated the technique of medical discovery in terms of every-day, commonplace thought, or learned the secret of imparting to the multitude of their patients a knowledge of the recent discoveries in medical science. Too many practitioners still see medicine from the curative and not from the preventive side. As a result the attitude of the public to the medical fraternity is, in a limited number of cases, an undoubting and blind faith; in countless others the attitude is a respectful but a fearful one; but in the cases of entirely too many of the remainder this fear

is supplemented by distrust. The story told by one of our visiting nurses is characteristic of this attitude. One of her colored patients overheard the conversation between the nurse and the colored doctor regarding her condition. When the physician had gone the patient turned to the nurse and excitedly cried, "Say, missus, is dere really anything de matter wif me, 'cause if dere is I wants a white doctor."

Attempts have been made in a number of ways to supplement the education of the common people given by the medical profession. The great newspaper and magazine press of the country has devoted pages of its issues to the attempt to popularize health education and to teach its readers modern theories. Frequently, in the exuberance of zeal, these attempts have over-shot the mark. The scare-head line has been adapted to health literature—even the germ has been muckraked. Like the trusts, the fact has been overlooked that there may be good and bad germs. A reputable and conservative magazine, in a recent article on insect life, uses the extraordinary caption, "The Horrors of our Back Yard." If the opinion of "Mr. Average Reader" were asked after the pabulum which has been offered to him, it would probably be found that he had become an Oriental fatalist. He would probably reply that since he was beset on all sides by invisible foes he had better cry "Kismet." His ancestors in the old days knew four elements only: water, air, earth and fire. The first two, which he formerly thought were his friends, he learns today are filled with invisible enemies. Even the earth which gave him food has grown treacherous and breeds tetanus. Fire, formerly his one great enemy, now seems to be the only weapon to protect him.

Another method of instructing the common people in hygiene has been through organizations for this specific purpose. I need only mention the imposing array of special hospitals, anti-tuberculosis movements, societies for combating infant mortality and infantile blindness, and others for teaching sex hygiene, eugenics and the like. To the extent to which they have followed sane and rational paths they have been invaluable. But even among these there have been lapses and an utter misconception of the point of approach. The result in the latter case has not been intelligent coöperation, but unreasoning fear. If, for example, compulsory segregation of the advanced consumptive means life imprisonment, we can imagine the despair and terror of the unfortunates who are banished, like Monte Cristo, to a living death. It is among this group that the charlatan and the quack reap their harvest. The new disease, phthisio-phobia, the result of some of our misguided teachings, is more virulent than the old-time "consumption." Can you imagine the mixed sensations inspired in the minds of citizens when, in a recent house-cleaning campaign, their coöperation was heartily invited by the authorities, and in the next breath they were told of fines and imprisonment for infractions of regulations? The

indifference on the part of many working people to sanatorium treatment for tuberculosis is caused by their knowledge of discharged patients who, owing to the lack of any provision for after care, soon revert to a condition of hopeless illness. The waste, both in time and money, in sanatorium treatment without subsequent care of discharged patients is incalculable. In his book, "The Milk Question," Doctor Rosenau has stated that "There is a temptation on the part of the popular exponents of science toward overstatement. When all the indictments are brought together we find that milk is an enormous criminal. The dangers are real enough and bad enough without the need of exaggeration."

In his article in a recent number of the AMERICAN JOURNAL OF PUBLIC HEALTH, Doctor Fulton has caustically commented upon the danger of overstatement in attempts to popularize sex hygiene. In the opinion of thoughtful men and women it is questionable whether some of the recent attempts made to educate children in sex relations may not, in the long run, be harmful rather than helpful. Too much of the well-meaning philanthropy and welfare work is of the "good fairy with the lorgnette" type. It does not take sufficiently into consideration the traditions and beliefs of its beneficiaries. In its attempt to cure and to prevent disease it has forgotten to be human.

Still a third method has developed for educating the masses in the elements of modern sanitation and hygiene. Our states and municipalities, through their health departments, have actively and energetically entered the field of popular instruction. The health officer's work necessarily has its limitations. As an official he is unwillingly, but alas too frequently, the man with the club. If he does not arouse fear, he unintentionally and unconsciously engenders suspicion. Rules and regulations of the average board of health, written as they frequently are in legal verbiage, have no tendency to produce peace of mind in the average reader. Too much, therefore, cannot be said in praise of those cities and states, still too few in number, which in spite of the difficulties inherently surrounding their work have nevertheless made determined efforts to popularize their activities and to educate their citizens.

Quite recently the realization has grown that insurance companies may become a valuable factor in educating the great masses of the population in human life extension. It is admitted that, in the great body of agents and medical examiners in the employ of life insurance companies, there is a potent force for educating men and women in the doctrines of sanitation and hygiene. Perhaps unconsciously the life insurance agent has always been such a dominant force. In the act of writing a policy or in soliciting the individual for insurance, he unconsciously, both to himself and to the prospective policy-holder, raises the question of the uncertainty of life and the need for conserving it to its fullest extent. The medical examina-

tion, to which the prospective policy-holder must submit in order to obtain his policy, again brings to his notice the possibility of early death, the uncertainties of life, and the risks and dangers which meet his path everywhere. No thoughtful man who insures himself for the protection of his family can take insurance without having forced upon him the conviction that of even more value to his family than the policy which he has taken are his ability and capacity to support his dependents more fully than they would be able to do for themselves with the proceeds of his insurance.

If, therefore, it is true that the insurance agent has unconsciously been the exponent of long life and right living, how much more would he be a factor if he would consciously undertake such activities. The educated industrial insurance agent is already beginning to take his place in the community as a social worker. It is he who is entering the homes of thousands of working men and women, insuring their families against the contingencies of death, and incidentally helping them and instructing them along all lines of social activity and social welfare.

Life insurance in the past has been a business. The rewards to agents have not been inconsiderable. Primarily it has been a matter of contract, under which two parties have definitely agreed to live up to certain obligations. It is becoming more and more evident daily, both in our legislative enactments and in the thought of the general public, that life insurance is not a business, and that it can no longer be conducted along purely business lines. Insurance today is really a great social institution. The insurance company is simply a medium through which aggregations of individuals protect themselves against the risks and contingencies of life. As such a social institution it must be conducted on social lines and it goes without saying that all of its representatives, officers as well as agents, must have the social point of view.

The particular value of the insurance agent in a health campaign lies in the fact that the relation between him and his policy-holders is largely a contractual one. The payment of premiums means the disbursement of a definite amount of money. For this disbursement the insured demands a *quid pro quo*. Naturally he desires that insurance benefits should be given to him at the lowest possible cost. If, through his education by the insurance agent, the assured can be made to realize that better care of his health will result eventually in saving to his pocket-book, there is given to him the direct incentive to coöperate with the company which insures him, in any campaign which it may undertake to improve health conditions. I believe this to be one of the vital differences, and at the same time advantages, of a health campaign conducted by insurance companies. Such a campaign typifies George Ade's moral, "In uplifting, get underneath." In the relation between the policy-holder and his company through the agent there is no sense of patronage, no attempt to superimpose the wishes and

possibly good intentions of any particular class or group. The policy-holder realizes that the motives which inspire the insurance company represent the concerted opinion of policy-holders, and that it is part of his duty to join in any experiment which the insurance company may make to improve his physical well-being and to make him live longer.

In this campaign of insurance companies the medical examiner as well can be a most effective agent. It is the business of the examiner to determine whether or not the individuals submitted to him for examination are desirable risks. Volumes could be filled with the histories of men who have been rejected for insurance by life insurance examiners. So far as I know, practically no attempt has been made by insurance companies to educate these rejected risks regarding the manner in which they should live in the hope that they may subsequently be entitled to insurance. In such a campaign, if it were inaugurated, the medical examiner would be a most important factor. As the result of the examination which he has made, he is in a position to give positive instruction to applicants for insurance and to guide them in a correct mode of life. It appears from the comparatively limited studies that have been made that re-examinations of policy-holders have had a beneficial effect, and that the advice given to those who were found below standard may result in a better mortality among this group. Unquestionably advice given by medical examiners to rejected risks would bring about similar results in a lowering of the mortality rate.

This thought leads up to another in connection with the value of insurance agents and insurance examiners as educators of the public in health matters.

In a paper which I had the honor to read before the American Public Health Association at the Richmond (Va.) meeting four years ago, I dwelt upon the possibilities of effective work through coöperation between insurance companies and health officers, and expressed the desire of the Metropolitan Life Insurance Company to coöperate with official health boards in preventing tuberculosis and other, preventable diseases. We were led to the belief in the value of such coöperation by the results obtained in the city of Chicago through the successful distribution by our agents of "The Little Ballot," in which the question of the erection of a municipal sanatorium was brought to the notice of the voters of Chicago. Since this paper was presented the services of our agents have been used in other municipalities, not only in the education of the masses in the necessity for municipal sanatoria, but during the past spring we have actively coöperated with health officers in city-cleaning campaigns. In fact in a number of cities the suggestion for such a city-cleaning campaign was brought to the notice of the mayor and health officers by our representatives. We recently sent a letter to health officers throughout the United States asking them for suggestions

regarding ways in which we might be of service to them. It is gratifying to report at this time on the willingness and at times even enthusiasm with which health officers have met this suggestion. Our correspondence with health officers is an extensive one and we are in hopes that the arrangements which have been entered into may be mutually beneficial.

I mention these facts to indicate to you that a health campaign, similar to the one which the Metropolitan Life Insurance Company has been conducting for the last few years, comes distinctly within the province of all insurance companies. The health of the communities in which they conduct their business is a matter of vital concern to them. If anything can be done through their agency staffs to develop public opinion for municipal health campaigns it will place in the hands of health officers the powers and the financial means to put their respective communities on a healthful basis. The insurance companies, while acting with a true civic spirit, may at the same time improve their own states by the probable reduction in mortality which ensues as a result of their activities.

Coöperation between health officers and insurance companies is only in its beginning. There are many possibilities still undeveloped for the health officer to avail himself of through the services of insurance companies, and the reverse. I need only mention the question of securing accurate vital statistics. It is unnecessary for me to dilate upon the great value of accurate vital statistics for insurance companies. If only the states in our so-called "registration area" today attempt to tabulate their mortality records in a proper way, it is due to the fact that the population at large has not grasped the significance of such statistics and their bearing upon public health. No one is in a better position than associations of insurance agents to develop a public opinion sufficiently strong to require legislators to empower their health departments to assemble their mortality records in a manner to be useful and available for further study and an analysis.

Of equal importance with mortality statistics are statistics of morbidity. The United States is woefully lacking in data of this kind. In fact it can be said that we practically have no morbidity statistics that are reliable. In Germany and other European countries every effort has been made for years, particularly through the sickness insurance societies, to tabulate their experience and to obtain a record of disease and of the causes which produce it. The need for similar studies has been well recognized by public health officials in the United States, and it is significant to learn that at a meeting of state and territorial health officials with the United States Public Health and Marine Hospital Service, held in Minneapolis during the week of June 16, a uniform bill for reporting diseases was presented, discussed, and unanimously adopted.

Here is another great opportunity for the insurance agent. Legislation

is not an automatic thing. The average legislator rises only to the height of the sentiment and desires of his constituency. By concerted effort it would be possible for the insurance agents of the life companies in the United States, by the distribution of the literature and by personal agitation, to bring about the enactment of such a uniform law in all the states of the Union.

If I lay particular stress upon the value of the industrial insurance agent in a health campaign, it is because of the peculiar relation which he has to policy-holders. In the first place, the industrial agent visits policy-holders weekly. This gives him an opportunity of getting into close touch with the insured. Very frequently he is of the same stratum of society as the policy-holder. The relationship between the agent and policy-holder is not one based on sufferance or condescension. He does not come in the guise of a charity visitor. He has nothing to offer in the way of doles or alms or gratuitous care. Quite frequently the relationship grows to be one of considerable intimacy. The acquaintance which ripens between the agent and the policy-holder soon loses its formality. The agent meets the family of the policy-holder not only when joy is in the home, but when sorrow and death enter there. Through the agent it is possible to bring to workingmen's families a knowledge of the laws and rules of sanitation and hygiene which cannot be obtained in any other way. The sense of confidence which the policy-holder has in the agent, through this constant meeting with him on a plane of equality, gives an opportunity of carrying out Ade's dictum "In uplifting, get underneath."

The modern conception of insurance as a social problem makes it desirable for officers of insurance companies to develop an agency staff instructed in the basic principles of modern hygiene; to distribute literature among policy-holders written in a popular form, so that the literature will be read and appreciated, instead of being consigned to the waste-basket; to develop a medical service for examination and re-examination of policy-holders, and a nursing service for their care when ill. When they have done this it remains for public health officers, or organizations and societies engaged in the improvement of health conditions, to make use of the machinery of the insurance company. What the possibilities are for the future along this line is indicated by what I have said regarding coöperation in the past.

How, then, may we develop the most rational scheme to make ninety millions of our people active participants in our campaign for the betterment of health conditions? How can we teach them that the modern theory of disease spells hope and not fear; that it is possible, by the coöperation of all, to minimize preventable sickness and to extend the span of human life?

(1) I am inclined to believe that there will be no dissenting voice to my

advocacy of the public school as the primary, all-important focus for the dissemination of health instruction. The child is at the plastic age when any form of instruction makes an impression, either good or bad, that is lasting and permanent. Our school curricula must be readjusted to lay more stress on the essentials of human life and health. One boy of my acquaintance, now in a high school, has never had a word of instruction in the rudiments of anatomy or physiology. I believe it to be more important to educate future men and women in human biology than to make them mental gymnasts. The school, supplemented by the home, must be the fountain head of health knowledge. The home, unfortunately, owing to the inefficiency of the schools in the past, still lacks parents competent to instruct their progeny. The children of today and of the future should have the training in hygiene and life conservation to enable them later, as parents, to instruct their own children. When such an ideal state of affairs exists, the need of many of our health conservation movements will have disappeared. Can one conceive of a situation more pathetic than the remarkable development, in recent years, of milk stations and similar agencies to educate "mothers" in the care of their infants. The eugenic legislation of the future will require not only physical fitness in those who contemplate matrimony, but will demand that if healthy children are brought into the world their nurture shall not be intrusted to incompetent and ignorant parents.

(2) Better opportunities should be accorded by medical colleges and schools for the education of physicians in the social value of instruction in sanitation and hygiene. The need for such courses of instruction is only too apparent. Considerable progress has already been made in this direction in Germany. The physicians who are employed under the compulsory insurance system of that country have long since realized the necessity for adequate preparation on their part to assist in popularizing the hygiene campaign conducted under the compulsory insurance scheme.

(3) Societies for the improvement of health conditions, public health officers, and insurance companies must come to an understanding regarding the functions of each and the possibilities which lie within the scope of each to bring about a better coördination of work.

(4) Insurance companies must see the duty which they as social institutions owe to their policy-holders in instructing and educating them in the principles of hygiene. Such campaigns may be and should be conducted by all companies whose interest is the improvement of the health of the policy-holders and the extension of human life.

(5) The true test, however, of the value of insurance in promoting health will be made only when a comprehensive system of sickness insurance is developed in the United States. Such insurance companies as have entered this field, and the various benevolent and mutual benefit societies which

insure their members against sickness, have as yet made but little effort to do more than pay sickness benefits in case of the invalidity of their policy-holders or members. Sickness insurance, as developed in Germany, whatever may be its defects and weaknesses, has demonstrated quite clearly that, under an insurance system which not only pays sickness benefits but gives medical treatment, it is possible to arouse the enthusiasm and coöperation of the insured in activities making for their physical improvement. The German compulsory sickness insurance scheme is fundamentally an effort to reduce unnecessary sickness. The careful study of the statistics which have accumulated in the past twenty-five years points the way to minimizing occupational hazards and resulting occupational disease. As a direct result of this form of insurance it was early recognized that to insure health decent housing conditions must be provided. Again, as a purely economic proposition, it was seen that it was cheaper to pay for the best possible treatment in the incipency of disease, rather than to let the sufferer become incapacitated and pay benefits for indefinite periods. Statistics of the German invalidity department of Berlin, in the last few years, show the gratifying results of such a campaign. It seems to be proved clearly by these statistics that year by year proportionately more old-age pensions and fewer invalidity pensions are being paid by the insurance department; in other words, fewer working men and women are becoming incapacitated at the earlier ages, and more and more working men and women are living to age 70, at which time the old-age pension automatically takes effect.

The educational value of such a scheme cannot be overestimated. Sickness is a matter of daily occurrence in the life of the average individual. It is not a thing of the dim future, like death and old age. Unnecessary sickness is a direct charge on the individual concerned. If he can be made to see that a lowering of the morbidity rate is something which affects him financially, his active coöperation in securing a reduction in the amount of illness can readily be secured.

WHY ARE MODERN INFECTIOUS DISEASES MILD?

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Read before the Section of Public Health Officials, American Public Health Association, Colorado Springs, September, 1913.

To offer an hypothesis explaining a phenomenon before being sure that the phenomenon exists is perhaps more a relaxation than a contribution to serious discussion.

Let me say that in offering an hypothesis to account for the relative mildness of modern smallpox, modern scarlet fever, etc., as compared with ancient, I feel that I am handicapped by lack of proof that they are relatively milder; and, instead of proof, I must offer the widespread but indefinite "general impressions" of a great many of the older physicians; the descriptions of these diseases as given by many of the older writers; and the statistically derived but only subconsciously credible apparent falling off in the mortality rates.

Against each of these sources of belief stands one or more possible fallacies. The decrease in the severity of disease as it presents itself to the old physician, looking backward, may be no more than an illusion, due to the greater impression made on his mind as a young man just setting out to establish his practice, by the cases he saw then, as compared with the smaller impression quite similar cases may make on him now; or it may be due to the fact that a physician is apt to judge by end results; and because modern treatment saves patients that would have died years ago, it seems to him to mean decrease in the severity of the disease, although it means only an increase in the potency of the treatment.

The descriptions of the older writers must be discounted also, for we all know that it is not very long since only severe forms of disease were recognized—since patients were hardly considered as sick unless they were nearly dead. It is easily within the memory of all of us that mild diphtheria, mild scarlet fever, etc., were looked on as innovations, hardly worth serious study, dreams of the faddists. Naturally all the old writers discussed and emphasized the severe typical cases—and naturally the impression arises that only such cases existed.

The comparison of older statistics with those of today to determine the relative deaths against relative populations would be of considerable moment had we any reason for confidence in either the figures for deaths or the figures for populations.

We know that both of these essentials are far from reliable now—we guess on good grounds that they were far worse fifty years ago. As for relative deaths to relative cases, we do not dream that these are any where nearly accurate now—and they certainly were not then.

Notwithstanding all this lack of definite proof I assume that the widespread impression of relative mildness today does correspond with the facts, in smallpox, diphtheria, and perhaps in tuberculosis, at least; although my own tentative belief embraces also most of the other specific non-venereal infections.

At all events, explanations are often offered for this alleged present-day mildness. Perhaps the most often offered is the most fallacious of all. This is the explanation which attributes the mildness to a gradually accumulating inherited immunity, affecting the race as a whole.

The fallacy lies here: admitting for argument's sake, that immunity might be acquired by the race as proposed, how long has the race been acquiring it? This immunity has shown its effects only in the last 100 years—or 50, or 30, depending on the authority and the disease. But the human race has existed 6,000 years (more likely 100,000). The human race has suffered these diseases 6,000 years (more likely 100,000). What sort of gradually acquired inherited racial immunity would that be which showed no effect for 180 generations (more likely 3,000) and then sprang up fully armed in the last two or three?

Sometimes the explanation (of mild smallpox at least) is based on gradually acquired inherited immunity from artificial vaccination. That explanation has the merit—a limited merit it is true—that it does take into account the recent development of the mildness, although only for the one disease, smallpox. But this has its fallacies also. First, the mildness of present-day smallpox does not seem to have developed gradually since vaccination first came into use. It seems to be confined to the last twenty or thirty years, or even less. Second, the present mild smallpox is not confined to the much vaccinated races, but flourishes everywhere. Last, and most important of all, how is it possible to consistently conceive the development in one hundred years of inherited immunization from cowpox, which itself protects the vaccinated only five years, when the virile and life-long protection afforded by virulent smallpox had operated in the race for thousands of years without any such effect at all?

The second most commonly offered explanation of the present day mildness of the infectious diseases is "improvement in general sanitation." Here again we have no human statistics which are conclusive. If we may judge from the testimony of careful breeders of prize stock, however, the tendency of hygienic surroundings is to make animals more susceptible to infections rather than less—and it certainly does not become us at this stage to claim that the race now crowding into cities and living in

auto and smoke dust is under more sanitary conditions than our forefathers, out in the country. I doubt if the careful inquiries we so talk about, but don't make, into the actual case-rate fatality of the infectious diseases, would show more deaths per cases in "unsanitary" surroundings than in "sanitary" ones. Every one knows that the obstetrician fears infection more in the rich man's home than in the slums.

The third explanation, already partially dealt with, is that of improvement in treatment. But this evidently does not apply, for the vast majority of the mild cases of smallpox, scarlet fever, etc., of today are not treated by physicians—in fact most of them are not seen by physicians at all! How is it possible that improvements in treatment *which are not used*, could affect the diseases—unless we cynically say that after all this very absence of treatment is itself the improvement?

In brief, it appears that existing explanations are fallacious, and that no long continuing, gradually developing old factor in life is adequate.

There must have been some new factor, something tremendously powerful, tremendously widespread, and yet thoroughly well disguised.

I offer for discussion the hypothesis that this factor was Lord Lister's introduction of surgical antisepsis and asepsis, and the following sequence of arguments in support:

Call to mind the fearful condition of hospitals, fifty, even thirty and twenty years ago, such that the hospital death-rates in major surgery reached to 60 to 80 per cent. Call to mind that these deaths were only the high-water marks of widespread blood poisonings, putrid wounds, gangrenes, and "laudable pus." This means that the hospitals, the patients, the practitioners who attended them, formed one great combination for the breeding, increasing of virulence and prompt widespread distribution of strepto- and staphylo-cocci. The practitioner of that day carried, as we all know, strepto- and staphylo-cocci to his obstetric cases. We all remember the discovery of the cause of puerperal septicemia and the prompt measures that followed, practically abolishing it. But the practitioner carried these germs not only to obstetrical cases, but to all, hence also to smallpox and consumption, to scarlet fever and measles, to diphtheria and whooping-cough.

True it was not recognized then, as it is now, that the non-specific infections with strepto- and staphylo-cocci do more harm in these diseases than the original specific infections themselves. But now, we recognize this and it is time to take cognizance of it.

We have learned to abolish surgical infection by appropriate bacteriological technique. We are learning to abolish cross infections in contagious hospitals, also by appropriate bacteriological technique, borrowed in many respects from the surgeons. What we need now is still further to extend this technique to the care of all septic medical cases, whether they

suffer from the specific infections or not; for if we abolish the strepto- and staphylo-cocci from the ordinary infectious diseases, we shall practically abolish the diseases themselves—that is we shall leave them so mild as to be almost negligible.

SUMMARY.

1. Although we should hold as our ultimate aim the abolition of the specific infectious diseases, it is well to remember that the chief harm that they do is due to strepto- and staphylo-cocci as secondary infections.

2. As a life-saving proposition, the abolition of strepto- and staphylo-cocci deserves more strenuous attention than the abolition of even the tubercle bacillus—ranking in this with the abolition of syphilis and gonorrhea.

3. The mildness of modern infectious diseases is due to the lessened virulence, smaller stock, and reduced distribution of the strepto- and staphylo-cocci formerly bred in our hospitals; and is to be ascribed to Lord Lister, who, however, probably did not foresee this development.

4. Public health men should campaign for medical asepsis as the surgeons did formerly for surgical asepsis; and not only in contagious hospitals, handling the specific infections, but also wherever septic cases are cared for. Indeed, we should probably gain immensely if all septic cases were isolated, as smallpox, etc., are now.

THE PRESENT STATUS OF PASTEURIZATION.

S. HENRY AYERS,

Dairy Division, Bureau of Animal Industry, United States Department of Agriculture.

Read before the General Sessions, American Public Health Association, Colorado Springs, September, 1913.

The art of pasteurization has made rapid progress during recent years. Only a few years ago the process was used secretly by milk dealers who simply made use of pasteurization as a means of preserving their milk.

Today pasteurization is so well known and its value so well recognized that it is the strongest advertising point of many milk companies.

Pasteurization is the heating of milk for a long or short period, as the various processes demand, at temperatures ranging from 140°F. to 185°F. The process is followed by rapid cooling to 50°F. or below.

The value of pasteurization may be viewed from both the sanitary and commercial standpoint. From a sanitary aspect, when properly performed, pasteurization affords protection against disease-producing organisms and has caused a reduction in the infantile death-rate resulting from intestinal troubles. From a commercial standpoint pasteurization is of value in increasing the keeping quality of milk.

There are three processes of pasteurization practised at present in this country. One is known as the flash or continuous process; the second, the holder or holding process, and the third is known as pasteurization in the bottle.

The flash process consists in heating rapidly to the pasteurizing temperatures, then cooling quickly. In this process the milk is only heated from thirty seconds to one minute and temperatures of 160°F. or above are usually used. In the holder process the milk is heated rapidly to temperatures from 140° to 150°F. and held at the desired temperature for approximately thirty minutes, after which it is cooled rapidly. Sometimes the milk, instead of being actually held for thirty minutes, is merely retarded in its passage through tanks so that thirty minutes is required for the milk to pass through. In such cases, however, there is no assurance that all the milk is held for the desired time.

The holder process, which is gradually replacing the flash process, is more efficient and is superior in every way.

Pasteurization in bottles is the most recent development of the process to be used on a practical scale. This process consists of bottling the raw milk in bottles with water-tight seal caps, then immersing them in hot water until heated to 145°F. The bottles are then held from twenty to thirty minutes. The cooling is accomplished by gradually lowering the

temperature of the water until the milk reaches 50°F. This method is now in use in several small milk plants. The advantage of the process of pasteurizing in the bottles lies in the fact that the milk, after heating, is not exposed until it reaches the consumer, thereby eliminating any danger of reinfection with disease-producing organisms through handling of the pasteurized milk. For this process to be successful it is, of course, necessary that the seals be absolutely water-tight, for the bottles are submerged in water and, during cooling, a leaking cap might allow infection by a polluted cooling water. The disadvantage of this process lies in the increased cost of pasteurization due to caps. It is claimed, however, that the saving in milk losses by pasteurization in bottles makes up for the added expense of seal caps.

In the pasteurization of milk one of the most important points is the prevention of reinfection after the heating process and, in this connection, I may say that we have developed a modification of the holder system of pasteurization which will prevent reinfection to a large extent. Briefly stated the process consists in pasteurizing milk at 145°F. for thirty minutes, then bottling it while hot into hot milk bottles which have been steamed just previous to filling. The bottles may be capped with ordinary paper caps and can be cooled by a blast of cold air. Laboratory studies of this process have been completed and the results are ready for publication. This process will be worked out on a commercial scale in the immediate future and it is hoped it will prove commercially successful as it possesses many points of merit.

The flash process is probably the most extensively used at the present time, although the holder process is fast taking its place. In 1912 we sent circular letters to dairies in all cities over 25,000 population, and from 231 replies found that 67 per cent. used the flash and only 33 per cent. the holder process. It is probable that at present a much larger percentage use the holder process. Only a small number of milk plants pasteurize directly in bottles for this process has only been developed recently in this country.

In general, the trend of pasteurization is toward the holder process and with this tendency the use of lower temperatures is becoming more universal.

As a general rule when the holder process is used milk is heated to 145°F. for from twenty to thirty minutes, and at least to 160°F. for one minute when the flash process is used. It is highly desirable from a bacteriological, chemical and economical standpoint that milk be pasteurized at low temperatures. From a bacteriological standpoint, pasteurization at 145°F. for thirty minutes gives assurance, as far as we know, of a complete destruction of disease-producing bacteria and, at the same time, leaves the maximum percentage of lactic-acid bacteria and only a small percentage of peptonizers in the pasteurized milk. When higher temperatures are

used the percentage of lactic-acid bacteria becomes less and less and the peptonizing group increases until at 180°F. and above, when the lactic-acid bacteria are practically destroyed, the majority of the bacteria left belong to the peptonizing group. The heat-resistant lactic-acid bacteria, which survive pasteurization at 145°F. for thirty minutes, play an important rôle in the souring of commercially pasteurized milk.

From a chemical standpoint the advantage of low temperatures lies in the fact that milk pasteurized at 145°F. for thirty minutes does not undergo any appreciable change which should affect its nutritive value or digestibility. Doctor Rupp of the dairy division has found that the soluble phosphates of lime and magnesia do not become insoluble and the albumin does not coagulate. At 150°F. about 5 per cent. of the albumin is rendered insoluble and the amount increases with higher temperatures until at 160°F. when about 30 per cent. of the albumin is coagulated. The heating period in his experiments was thirty minutes.

From an economic standpoint the advantage of pasteurization at low temperatures lies in the saving in the cost of heating and cooling the milk. For example, from data obtained from the dairy division, it has been figured that it requires about 23½ per cent. less energy to heat a given volume of milk to 145°F. than the same volume to 165°F. and in the cooling there would be less heat units to be removed and, therefore, the same percentage of saving during the cooling process.

In view of the advantages of pasteurization at low temperatures it seems advisable to recommend that milk be heated to 145°F. and held at that temperature for thirty minutes.

Pasteurization, at present, is looked upon with favor by medical men, sanitarians, dairymen and consumers, but the art has not developed without opposition and even now its value is not universally accepted. Most of the objections to pasteurized milk have been based on theory or upon experiments in which the milk was pasteurized at high temperatures, or upon clinical observations.

One of the greatest objections to pasteurized milk has been that the heating destroyed the lactic-acid bacteria and that putrefactive organisms were left which, when relieved from the restraining action of the acid-forming bacteria, would develop, forming poisonous toxins and putrefactive products. It was believed that the milk, on account of not being sour, would be consumed in that condition. This objection was based on experiments in which milk was heated to temperatures near the boiling point and cannot be applied to milk pasteurized at low temperatures. From the results of five years' work in the dairy division on commercial pasteurized milk we have found that such milk sours, as does raw milk, but the souring is delayed. As pointed out earlier in this paper pasteurization at low temperatures does not destroy all the lactic-acid bacteria for certain strains

are resistant to heat and are able to stand temperatures higher than 140°F.

Another objection to pasteurized milk has been that bacteria grow faster in it than in raw milk. In spite of several experiments which seem to prove this point, it has never been proven. We have found that the rate of bacterial increase is approximately the same when the comparison is made between raw and pasteurized milk having about the same bacterial content.

The objection that chemical changes are produced by pasteurization which render milk less digestible, particularly in the case of infants, may be true when milk is treated to high temperatures, but as previously stated milk pasteurized at low temperatures does not undergo any appreciable change.

It is often stated that pasteurization, even if it does destroy bacteria, does not destroy poisonous products of their growth. This can hardly be considered a real objection for if they are present in raw milk they must be consumed with it, and, if pasteurization does not destroy them, the pasteurized milk would be no worse than the raw milk.

The question as to whether or not pasteurization destroys beneficial enzymes is still an open one. In the light of our present knowledge of the enzymes in milk and the part they play in the digestive process it is quite impossible to settle the question of their importance. One point is evident, however, that the low temperatures now in use in pasteurization have little effect on the commonly recognized enzymes of milk.

The opponents of pasteurization have raised an objection on the ground of its indirect influence on the milk producer. It has been claimed that pasteurization would cause lax methods of production on the farm for the reason that farmers would know that the milk was to be pasteurized and, therefore, they could be careless in the production. This objection seems rather exaggerated and unimportant for in any city where there is any inspection of the raw-milk supply the same inspection can and should be continued even though the milk is to be pasteurized.

The process of pasteurization is by no means fool proof. It demands a knowledge on the part of the operator of a pasteurizing plant of the action of the process and its objects. Do all operators have such a knowledge? Undoubtedly they do not. Records of temperatures used in 231 milk plants, which were obtained by circular letters, showed that 99 per cent. of those which used the holder process pasteurized at proper temperature. Among those which used the flash process only 57 per cent. used the proper temperature, while the other 43 per cent. used temperatures too low to be effective in the destruction of pathogenic bacteria.

Any one who has had the opportunity to examine the numerous plants where pasteurization is practised has undoubtedly found cases where as

many bacteria were introduced during cooling and bottling as were destroyed by the heating process. It is in such cases that ignorance on the part of the operator of the fundamental principles of the process is most strikingly shown. One false step, such as running pasteurized milk through a dirty piece of cheese cloth before it enters the bottle filler, may undo all the previous work. Pasteurization is an added expense, and merely as a matter of business, after the process is properly performed, it is hard to believe that any one would wilfully allow the results to be spoiled by a single operation, no matter whether the object of the process was to produce a sanitary milk or merely to preserve it. The failure of a few plants to properly pasteurize is no reason for condemning the process of pasteurization. In such cases a little education will often produce marked improvement and enable the milk dealer to meet city regulations.

Regulations relating to pasteurized milk should be based only on accurate scientific data. It is often the practice to demand a bacterial reduction of 99 per cent. during pasteurization. It is an easy matter to destroy 99 per cent. of the bacteria in milk when the raw milk contains large numbers. It is often impossible, however, when raw milk contains around 100,000 bacteria per cubic centimeter to destroy 99 per cent. on account of heat-resistant bacteria which are not necessarily spore formers. In a large number of experiments in which we pasteurized milk under exact laboratory conditions, where no reinfection was possible, in one sample only 17 per cent. of the bacteria were destroyed. Often 99 per cent. of the bacteria may be destroyed and yet the pasteurized milk may still contain hundreds of thousands while in other cases where the milk contains only tens of thousands the percentage reduction may only have been from 80 to 90 per cent.

In the control of pasteurization it is essential that the proper temperature be used and that the process is so performed that no reinfection takes place. This can only be accomplished by direct supervision of milk plants by trained men who have authority to carry on such supervision. It is not the idea even of the most ardent exponents of pasteurization that any grade of milk should be pasteurized and consumed and that farm inspection can be eliminated. Filthy milk is not fit for human food under any condition and need not be tolerated.

In the present status of pasteurization the ideal to be achieved is to use the process not to make a dirty milk a clean milk but to make a clean milk a safe milk.

JAN 1919

WHAT GOOD HOUSING MEANS.

JOHN IHLDER,

Field Secretary, National Housing Association.

Read by title, before the General Sessions, American Public Health Association, Colorado Springs,
September, 1913.

The question of how we, individually and as communities, are to secure good houses has recently begun to attract national attention. As usual it began in a negative way with hot debates over certain details. Also, as was natural, it began with a study of the worst phase of our housing—the piled-up tenement dwellings of our largest cities. But during the past three years the growth of interest in housing has been so great that we can now cease to confine our attention to the worst housing abuses and begin to think of housing in a broader way as it concerns us all.

The rapid change in our point of view is evidenced by the change in housing legislation. Three years ago such legislation dealt almost exclusively with tenement houses or multiple dwellings. In some cities, as in Boston, a tenement house was defined as one that contained four or more families. Consequently only a small fraction of three-decker Boston was subject to regulation. In a larger number of cities the tenement house was defined as one that contained three or more families. This was the New York rule, and was copied by many other cities. In New York, and especially on Manhattan Island, the great barracks dwelling had become so common that the law safeguarded in a measure a very considerable proportion of the people. But even in New York, notably in Brooklyn and in the outlying districts, there were large areas where the tenement house had not yet appeared in any great numbers and where, consequently, housing was not regulated in the interest of the tenant or of the community. In the smaller cities which imitated New York's law the effect was scarcely noticeable.

The trouble was that we had permitted ourselves to believe the problem purely a problem of the tenements of the poor, that the need was adequately met if we saw to it that the barracks, which we assumed were the only dwellings that could be erected for the urban poor, were provided with certain minimums of light, air, water, toilet conveniences and safeguards against fire. Of course those who were working on the problem knew the falsity of this belief. When they came to impose minimum restrictions for tenements on the lower East Side of New York they found that these minimums were greater than the amounts given to the well-to-do in many expensive apartment houses. Fortunately it proved impracticable to

draw a legal distinction between the tenement house and the apartment house, so those of us who live in New York are sharing in the benefits of the poor.

But for all this the idea persisted that tenement house legislation was a boon from which the more fortunate members of the community—those who in popular phrase are “able to look out for themselves”—and the community as a whole benefited only indirectly if at all. Consequently recent laws, like that applying to the New York state cities of the second class, mark a tremendous development of our understanding. This law covers not only multiple dwellings but two family houses and private dwellings as well. And it covers not only buildings in which families are supposed to live more or less permanently, but also lodging houses, hotels, and other temporary shelters for the detached. This law will protect the merchant, the lawyer, the salaried man, even the city sanitarian and the health officer, and their families, against the development of evil conditions from which as individuals they would be powerless to escape—even though they do belong to a class which is mistakenly supposed to be able to look out for itself. When Manhattan became an island of tenements, many who are classed as well-to-do found that they were forced to live in tenements, and in such tenements as were provided for them, with gloomy, airless bedrooms, and dark, smelly kitchens. We like to think that we are free agents, but as a matter of fact we usually take what is handed to us. Our chief means of protection is to make the handers keep all their goods up to a wholesome standard.

So we have begun to realize that the problem of getting good houses is not merely a problem of the poor. It is not a problem of any one class, to be solved in a more or less superficial way and then forgotten. It is a problem that affects directly and vitally the whole community. Consequently it is essential that we stop looking at it from a purely professional point of view and take into consideration the human relationships that are involved.

There is some basis for the widespread distrust of the professional man. Experience seems to show that our custom of putting an amateur to boss a professional has its practical benefits. For if we give the professional all the rope he wants he is apt to hitch it to his own particular professional star—a proceeding sanctioned by high authority—and then climb clear out of sight of the multitude leaving practical problems unsolved.

There is the architect who is so interested in his elevations, in the placing of his windows so that they will compose properly when viewed from the street, that he quite forgets the people who are to live inside the house and make practical use of the windows. There is the builder whose attention is concentrated upon the capitalist, who thinks of houses only as revenue producers, entirely ignoring the people who are to pay the revenue.

Recently in Boston I met one of these builders. He was very indignant over the present agitation to secure laws that will make the Boston three-decker less of a fire hazard. Such legislation will, of course, decrease the number of three-deckers by increasing their cost. Incidentally it will probably increase the number of two-family and single-family houses. This to him seemed a wanton injury to the small investor. He cited the instance of a man for whom he is building a three-decker. This man was just able, under present conditions, to get enough capital for his enterprise. When it is finished he will have an apartment for himself and two to rent, so getting a good return on his investment. If the proposed law were enacted the man would have to be content with a two-family house. This, the builder thought, an unjustifiable invasion of the man's right to do as he would with his capital.

"Why," he explained, "I live on the third floor of a three-decker myself. I prefer it because I get better light and air up there."

Not until after he had said it did he realize that for every third-floor family there are two deprived of the light and air shut off by the third-floor apartment.

The health officer, the sanitarian and other scientists who serve the community are, perhaps, not subject to such comments as this, except when they are compelled to submit to political pressure. Their professional interests are more impersonal, they are not so greatly tempted to serve one class at the expense of another. But assuming this, can they do their full duty if they approach their work only from the professional standpoint? Is there not danger that the interest of professional problems, detailed technical problems, will blind them to larger human problems in the solution of which they can and should, by virtue of their offices, exert a great influence?

This is the day of the specialist, and because of the specialist we have made great advances. But also, because the specialist has tended to confine himself to his speciality, we have suffered some serious losses. The friendly, human attitude of the old-fashioned family physician was an asset that balanced a good deal of liability in the way of lack of technical knowledge. His title of "family doctor" is the key to much of his success. To him the world was not what it is coming to be in this age of obstetricians and baby specialists, when each process is presided over by a different man, a world of individuals. It was a world of families. This leaves a place to be filled, and by whom can it be better filled than by you whose interest is in the well-being of the whole community?

Yet as one reads over the titles of the papers submitted to this conference he feels that the community doctors cannot have fully realized the opportunity open to them. Here we have learned discussions on a multitude of technical details, but all treating mankind as an unrelated mass of indi-

viduals. And this though we all know that the community is not composed of so many thousand population except in the census returns and in the dreams of the Chamber of Commerce. It, or the only really important part of it, the part that brought us up from savagery, the part that carries our hope of a better civilization in the future, the part that holds us safe and secure in the present, is composed of families, of households.

It is important that we have a pure water supply, that we dispose of our garbage and rubbish in a sanitary manner, that the milk for the babies be clean and nourishing. And it is important that we learn from each other the latest and most scientific methods of bringing all these good things about. For it is important that we keep what we have. But it is not less important that we be able to get more than we have at present. It is a rule of life that we must either advance or retreat, we cannot stand still. And to get more we must make the conditions such as will encourage *production*, not merely miserly safeguarding. This means we must give attention to the family as the unit of society rather than concentrate our attention upon individuals.

We deal much in assumptions, necessarily, having only three score years and ten in which to reach our conclusions. But occasionally it is necessary to take up an old assumption and examine it. Most of our cities assumed until two or three years ago that they were cities of homes. Now they are examining that assumption and they find it needs revision. We have assumed—in spite of talk about easy divorce and the advisability of requiring a physical examination before marriage—that the American family was getting along famously. Is it? Are there not developing in our cities conditions that threaten the American family more than do easy divorce and venereal diseases? May it not even be that these conditions have something to do with the increase of divorce and the prevalence of venereal disease? The specialists in these two epidemics get an occasional glimpse at their causes. But are not you, who are so interested in keeping down the death rate, really in a better position than others to learn what keeps down the birth rate? And being in such a position should you not take advantage of it, and, having learned, use all your influence to prevent or to remove the causes?

Of course I am somewhat subject to the limitations of the specialist myself. But it seems to me that my specialty throws at least a side-light on the problem. There is, I believe, as direct a connection between the kind of house a family lives in and the vitality of its family life as there is between a windowless bedroom and the physical condition of the individual who sleeps in that bedroom. Sociologists have begun to show a considerable interest in the effect of the house upon the family. Dr. Charles W. Eliot, president emeritus of Harvard, said:

“Bad housing is the fundamental evil in all cities, for it develops many

physical and moral evils. It is the main problem not only of large cities like Brooklyn, but of small cities like Cambridge. At this moment in Cambridge, three-family houses are being rapidly erected with not more land about them than is sufficient for passage on foot; and they are mostly of flimsy construction in wood. The rent of a flat in these houses is higher than that of an independent house with a garden was in Cambridge thirty years ago. This kind of dwelling obliges its occupants to have almost all their recreation outside the dwelling, in the streets, theatres, saloons, and other public places. An immense change in family life is consequently going on in all our urban population."

Observers in New York and in Philadelphia have noted that the small house of Philadelphia encourages a neighborliness that forms the basis of wholesome social relations between families, which is conspicuously lacking in tenement-house New York. Tenement parents and children make their friends as individuals not as members of families, and their companionship and amusement are sought on the street, not in the home. As the number of rooms grows smaller, as the size of the rooms diminishes, which they inevitably do in barracks construction, friends are crowded out, additions to the family crowded back. The very type of building tends to discourage any natural instinct for having children. In the apartment they are constantly under foot, in the halls they are a nuisance to neighbors who are neighbors by proximity only, on the street they choose their companions from a whole city full without let or guidance. The apartment is not in any sense a home, except in the primary one that it offers shelter from the elements. And in that it is better only in degree than the cave which sheltered our remote ancestors. All the customs and the sentiments that have grown up around the home since we began to build houses must be cast aside if we again seek refuge in cliff dwellings. And with the going of the home will go the old conception of the family.

I have a great faith in statistics. It began when I believed implicitly in a single statistic that I had dug out for myself. It persists now when I wait for the returns of the United States census—and sometimes find the waiting long. It leads me to seize with avidity upon such a statistical discovery as that of Dr. Walter F. Willcox of Cornell, that single men die more readily than married ones. For that is as it should be. It makes interesting the pages of long reports on hookworm which show the close connection between a certain phase of bad housing and disease. And it shows an underlying cause of the decreasing birth rate that at present is so alarming Germany, as France has been alarmed for more than a generation.

In Germany the professors of preventive medicine have scored many victories. As a result the death rate has fallen steadily. But like those of France they have failed to keep up the birth rate. Especially in the

larger cities, which like New York and Paris are cities of tenements, is the decrease notable. Statistics show that in Berlin the proportion of childless couples is increasing and that the two-child limit is becoming the normal thing. And this just at a time when we had begun to hope that we could make our cities self-perpetuating. No longer were we to admit with humiliation that the city, which is the center of civilization, destroys those who make it glorious. We prophesied that the time was at hand when the city would be so sanitary that no longer would it be necessary to draw upon the country for raw recruits to take the places of vanished city families. And just as we were about to proclaim our triumph, we find that the fight is still far from won.

We have done great things, and in the doing of them have created a new profession, that of preventive medicine. Since the days when the physician was content to cure those already sick to these days when the physician, whatever his technical titles, labors to keep men from becoming sick, we have advanced far. But perhaps the time has now come when we must create another profession, that of "constructive medicine." Its field may be even larger than the field of preventive medicine, the multitude of its practitioners divided into a greater number of groups than those who now guard our food, our water, our air and our neighbors from infection and contagion. And one of its tasks will be to see that our houses are adapted to serve as family homes. For that is what good housing means.

What we have won in the long fight to make our living conditions more sanitary, we must keep. And as our cities still have thousands of windowless rooms, hundred of thousands of disease-spreading privy vaults, we must add much to what we have already won. But at the same time we must bear in mind that a house, even if it is superlatively sanitary, may not be a good home, and so be on the alert to check bad types, to encourage good types of houses. Otherwise the day may come when, our preventive work successfully finished, we shall look about us and see a race that perishes, though without disease.

Then we may understand the feelings of the Mobile darky of whom I heard last winter. He was about to be hanged. Before letting him fall the sheriff, who was a tender-hearted man, said, "George, would you like to say a few last words befo' I let you go?" "Yass, sah, yaas Mist. Sheriff, I would like to say a few last words," replied George, "Ah'd jest lake to say that this curtainly will be a lesson-to me."

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IMPORTANT ANNOUNCEMENT.

At a joint meeting of the Committee of Seven and the Committee on Journal of the American Public Health Association held in New York, December 27, Dr. Livingston Farrand tendered his resignations as Treasurer of the Association, and Editor of the JOURNAL. Doctor Farrand has accepted the Presidency of the University of Colorado, thus making it necessary for him to relinquish his various offices. His resignations were received with deep regret and with sincere appreciation for his untiring efforts on behalf of the JOURNAL and of the Association. Members of the Association and subscribers to the JOURNAL will unite in wishing Doctor Farrand a splendid success in his new endeavors.

The Committee of Seven is glad to report that Dr. Lee K. Frankel of New York City has kindly consented to fill Doctor Farrand's unexpired term as Treasurer.

New arrangements have become necessary in regard to the management of the JOURNAL and Prof. Selskar M. Gunn, who has served as Managing Editor for the past two years, has been asked to undertake full editorial duties, and to transfer the business management of the JOURNAL to the Boston office. This he has agreed to do and hereafter all communications with regard to the JOURNAL should be addressed to the Boston office, 755 Boylston Street, which is also Professor Gunn's address as Secretary of the American Public Health Association. This centralization of the JOURNAL and Association activities will result in economies and in increased efficiency. With this issue of the JOURNAL Dr. Philip P. Jacobs, who has so faithfully and energetically served as Business Manager, will conclude his services in order to take up additional duties in connection with the National Association for the Study and Prevention of Tuberculosis. Dr. Henry L. Mann of Boston, who has been connected with the business management of the *Atlantic Monthly*, has been chosen to take Doctor Jacobs' place. His address will also be 755 Boylston Street, Boston, Mass.

A board of Advisory Editors has been established and the following gentlemen have consented to serve in this capacity: Dr. William C. Woodward, Washington, D. C., Dr. Charles V. Chapin, Providence, R. I., Dr. Peter H. Bryce, Ottawa, Canada, Dr. Livingston Farrand, Boulder, Colo., and Prof. George C. Whipple, Cambridge, Mass.

The Committee on Journal bespeaks the continued active support and interest of all subscribers to the JOURNAL, and believes that the JOURNAL is serving a very useful purpose in regularly reaching an ever-increasing number of men and women interested in, and working for, the promotion and advancement of public health knowledge. This JOURNAL should be self-supporting, and the only way in which this can be brought about is through the continued growth of the subscription list. Are there not individuals in your community who would be interested in, and glad to subscribe to the JOURNAL were their attention drawn to it? We believe there are. We need your coöperation. May we have it?

Advertisers, subscribers, and all others having business with the Journal are requested to note the change of address. Please be sure that this change is made on your books. All communications hereafter, should be addressed to 755 Boylston Street, Boston, Mass. Make this correction now!

DRUG ADDICTIONS, A PUBLIC HEALTH PROBLEM.

DR. C. E. TERRY,
City Health Officer, Jacksonville, Fla.

Read before the Section of Public Health Officials, American Public Health Association, Colorado Springs, September, 1913.

Were the province of health conservation still limited to the control of obvious contagion, or could we deal with the immediate alone and yet hope to attain ultimate success as sanitarians, this paper would require an apology if, indeed, it were permitted a place upon your program. The etiology of public maladies, however, is daily presenting a more complex study, and factors, other than those known to be specific, are assuming more important relationships to their onset and course.

We find that the control of tuberculosis leads us far behind the careless disposition of sputum or the fumigation of infected apartments, to conditions of housing, of labor, personal and domestic hygiene and ultimately to the gnarled limb of the family tree where, the eugenist tells us, was first made an improper selection. With whatever infection or insanitary problem we may concern ourselves, there are interwoven, in most instances, a mass of predisposing factors which have a more or less direct bearing upon the matter in hand, and no one of which may be long ignored without discomfiture.

As a potent social and economic cause leading to much of our public sickness and inefficiency, I would present some facts relating to habit-forming drugs. In investigating this community ailment I have endeavored to relate, as far as possible, the various causative factors with the conditions found and their control.

The obtaining of accurate or complete data concerning the use of opiates is not without practical difficulties. These habits are more carefully concealed even than the existence of venereal infection and, fostered as they are by the cupidity of a considerable class, ordinary methods of investigation are of little use. Rumors and fragmentary information reaching me from time to time indicated certain channels of supply and the necessity of some well enforced regulation at once prohibitory and provisionary became evident. Our state law is entirely inadequate and a revelation of its weakness, made through some prosecutions undertaken by the State Pharmaceutical Association, which all resulted in *nol proseques*, indicated the need of a more comprehensive and quick-acting law.

In August, 1912, the City Council passed, at my request, an ordinance regulating the sale of certain drugs, those commonly employed by habitues,

opium and its derivatives, cocaine, eucaïne, etc. This bill in general resembled those in operation elsewhere, requiring a written prescription from a practising physician, prohibiting refilling and demanding that a record of sales be kept by druggists. Further it required that each prescription bear the name and address of the individual for whom it was intended and that a true copy of any prescription containing more than a specified amount of the drug named be sent, by the physician, to the office of the health department. Granting that sales would be made only on prescription this provision was intended to discover the number and location of users and also what class of physicians would, for the most part, lend their services to the fostering of these habits.

Another section provided that habitual users could obtain, free of charge, prescriptions for the drugs named from the health officer providing he might deem it advisable to issue them. It might seem, at first sight, anomalous that a bill aimed to curtail the sale of certain drugs should provide for the furnishing of gratuitous prescriptions by the health department. This provision, however, was the keynote of the whole bill, its intent being, first, to remove any shadow of an excuse for an illegal sale by a druggist, on the plea, frequently made, that the purchaser, an habitual user requiring a supply, was unable to pay for a prescription, and second to bring the health officer into personal contact with the unfortunates addicted to drug habits. Indeed, without this provision, little, if any, of the data given below could have been obtained.

The bill further provides for the separate filing of all such prescriptions by the druggist and the keeping of a book record of those filled, together with the names and addresses of the purchasers and the physicians writing them, this record to be at all times open to inspection by the health and police departments. The finding of these drugs in the possession of anyone other than a druggist or physician was made a misdemeanor, except the possessor could show that he came into such possession in accordance with the provisions of the ordinance.

Before this bill was submitted to the council, it was discussed and approved, section by section, by the local medical society and before its passage a public hearing was held to which the wholesale and retail druggist were invited to criticize it and make suggestions. After its passage, a few druggists chose to consider its requirements not essential to their business; these were promptly prosecuted and received the "limit" at the hands of the municipal judge. After these occurrences it became extremely difficult to obtain, in Jacksonville, any of the habit-forming drugs except through the authorized channels. Physicians and druggists were all notified and furnished copies of the bill and, except for an occasional violation, the ordinance has been in complete operation for a year at the present writing.

I have kept card records of all cases obtained through duplicate prescriptions sent in by physicians and of those coming in person to the office. These cards are kept on file and each prescription given by me or received in duplicate is entered with the date. A total of 646 users have thus been recorded together with the drug or combination of drugs used, the amounts and the physicians prescribing them.

This number represents, with considerable accuracy, the number of users in the city, about 1 per cent. of our population. Some of those recorded were transients and are not now in the city, but these are offset by a number who obtain their supply by mail from other places and a few who, I have good grounds for believing, are furnished directly by physicians in order to avoid my records.

These 646 users are divided into:

White,	416	{	males,	167					
		{	females,	249					
					or			{	males, 266
Negroes,	230	{	males,	99				{	females, 380
		{	females,	131					

Our population is composed about equally of whites and colored so that it is seen that, with us at least, the whites are far more prone to drug addictions than the blacks. Our white population is more cosmopolitan than that in most cities of the far South and I believe, judging from that fact and from the types seen, that the prevalence of drug habits among the whites would average about the same as elsewhere. In a community, however, which lacks our large negro element, the extent of drug habits, as regards the total population, would probably be greater than with us.

Divided according to single drugs used we find that morphine leads with a total of 241 or 37.6 per cent.; cocaine is next with 173 or 26.7 per cent., then laudanum, 122 or 18.8 per cent., heroin, 29 or 4.4 per cent., and gum opium, 14 or 2.2 per cent.; to these must be added those who use a combination of cocaine with some opium derivative. Of these there are 67 or 10.3 per cent. of the whole.

Of those using a combination of cocaine with some derivative of opium, the whites far exceed the negroes, probably because of greater knowledge as well as owing to the increased cost. By sexes, the white males outnumber the females two to one while the colored females outnumber the males nearly four to one as combination users. This, I think, is explainable by the fact that, as a rule, those using the combined drugs are of the most depraved class of whites, both male and female, and the colored women are in closer contact with this class of users than are the men,

many of them being employed as domestics in the restricted districts where so many of the white cocaine and morphine combination users are found.

The two races show a decided difference in their selection of drugs. Of the whites 81.9 per cent. use true opiates alone and 18.1 per cent. only cocaine while of the negro users 49.5 per cent. are addicted to the true opiates and 50.5 per cent. to the more stimulating cocaine.

In both races the female users outnumber the males 58.8 per cent. to 41.2 per cent. while, as might be expected, the largest proportion of true opiates users, 66.5 per cent., are found among the women and of cocaine users 54.3 per cent. among the men.

With 213 drug habitues, or roughly one third of those recorded, I have come in personal contact and have obtained from them more or less complete histories as to age, duration of habit, occupation, income, social state and factors leading to the formation of their habits. From these histories it would appear that the age period which furnishes the largest number of users for any period of similar length is that from twenty-five to thirty-five years. This period furnishes 47.5 per cent. of all users. In the first half the males predominate slightly, in the second half the females predominate quite markedly.

From the average age of the individuals and the duration of their habits when first seen, I find that the average age of beginning is 26.1 years for males and 27.4 years for females, the women starting fifteen months later in life than the men. The average age of beginning for both sexes is 26.7 years. As the ages of users advance the proportion of females increase relatively. Whether this is because the exigencies of life with the male render his cure or early death more certain, or whether the later period at which the female user is created affects this apparent greater longevity, are questions which, with many others pertinent to the subject, remain yet to be answered.

A further study of these histories brings to light information of real value as relating to the causes, both direct and indirect, which appear responsible for the creation of the user. In this connection I will state that these histories are seldom obtained during the first visit or two of the user to my office but rather after repeated visits and kindly treatment have served to establish more or less confidential relations. It may be said that mendacity is a common attribute of the drug fiend and that information so obtained is not reliable. I can only state that from the beginning I have tried to encourage their trust in every way; that much of what I have recorded has come unasked and little by little at different visits; that my contact with individuals has been almost daily, and that the quite evident frankness of many who admit dissipation and evil ways, as entirely responsible for their condition, leaves no good reason for doubting

those who, with equal frankness and for the most part without rancor, place this responsibility on others.

As direct causes of drug-habit formation, I have divided these 213 histories as follows in the order of their frequency:

Through physicians' prescriptions or treatment personally administered	54.8%
Through the advice of acquaintances (for the most part themselves users)	21.6%
Through dissipation and evil companions	21.2%
Through chronic and incurable disease	2.4%

The last named cause is accounted for by three cases of chronic asthma, one of arthritis deformans and one of intestinal carcinoma. They require no comment.

The 21.2 per cent. who acquired their habit through dissipation need not be considered for the moment; they represent probably a class who, had the narcotic not been available, would have satisfied their desire for excesses in some other way, in fact many of them are alcoholics or worse and general measures of control would largely cover them.

The next largest class, 21.6 per cent., who acquired their habit through the advice of friends and acquaintances may be considered as closely related to the largest class of all. By acquaintance I mean, not vicious companions, but individuals who, themselves physical sufferers, have in some way become addicted and thoughtlessly pass on to another their dangerous knowledge, unmindful of its probable result.

With this class of individuals and that largest class of all, the 54.8 per cent. who owe their unfortunate condition to the offices of the medical man, are we most concerned as public health officials. It may seem a strong statement to make that over 50 per cent. of drug users owe their habit to the medical profession, and yet I am convinced that my figures are not far wrong. In order to more fully appreciate the probable truth of this assertion I have endeavored to present, in the following tabulation, further details where individuals have placed the responsibility for their habit upon their attending physician. I have determined, as accurately as possible, the ailment for the relief of which an opiate was prescribed. In 115 cases the following conditions were designated:

Rheumatism (acute articular, gonorrheal and luetic)	30	26.0%
Accident and operations	29	25.2%
Protracted illness (undefined, some apparently neurotic)	18	15.7%
Pelvic trouble (inflammatory)	14	12.2%
Neuralgia (mostly facial, two or three sciatic)	11	9.6%
Headaches (undefined)	4	3.5%

Asthma.....	3	2.6%
Malaria.....	3	2.6%
"Nervous Prostration".....	3	2.6%

In reviewing these conditions it is worthy of note that the majority of them are protracted, chronic or recurrent in nature. It would appear, however, that "accidents and operations" had claimed more than their share of victims, inasmuch as they are surgical conditions, for the most part of short duration and ending in permanent relief. Indeed, if the statements made to me are true, the number of this class occurring in hospitals is without excuse in good practice. In none of these conditions does an opiate accomplish more than temporary relief of pain, with the exception of the three asthmatic cases where a more or less specific effect might be claimed. It is also worthy of note that, in *every one* of these cases, the condition for which the drug was originally given had long since disappeared, the habit alone remaining in testimony to its one-time existence.

Here were 112 men and women become confirmed drug habitues through the judgment of as many physicians who elected to submit their patients to this risk, in order to relieve varying degrees of pain caused by conditions which, for the most part, were in no way permanently benefited by the administration of an opiate, no small number of which were amenable to surgical interference or other well-recognized treatment, and where, in some instances, opiates, by every rule of intelligent practice, were distinctly contra indicated! Surely here were assumed, in view of subsequent events, responsibilities too heavy to be lightly borne.

In many instances these first doses were not given at the bedside to allay severe pain, but handed out to office patients with apparently as little concern as a dose of calomel. Codeine, morphine, heroin and laudanum are all thus passed over to the temporary sufferer; the neurotic woman with obscure symptoms, the young mechanic with a broken arm, the over-tired business man; to young and old, it matters not, who chance to stray into the wrong office and who pay the price of their evil choice years after their faces are forgotten and their fees spent by the "expert" who so readily relieved their symptoms. Not only are these drugs carelessly prescribed but we find many repeated orders to "refill the prescription and then let me hear from you," the patient in entire ignorance, not infrequently learning for the first time from another physician or a conscientious druggist the nature of the "remedy" in which they have been placing their hope of cure.

Not infrequently is the refilling done without the knowledge or advice of the physician, who, were the opportunity given him might seek to cover his mistake, and equally responsible is the druggist who, in full knowledge

of their danger, refills such prescriptions as often as requested. In some instances this is done through a mistaken conception of professional ethics, through an ill-advised hesitancy to call upon the physician for advice; in others through indifference equal to his and in all too many, to avoid losing the trade of one who, experience has shown, will be a constant and remunerative customer. For the past year morphine has been selling by the jobber at an average price of about sixty-five cents a drachm and cocaine at about fifty cents. The usual price paid by habitual users is \$1.25 for original drachm bottles, a profit of one hundred per cent.

Some druggists, whose trade of this nature is large, sacrifice these commodities for \$1 a bottle contenting themselves with a profit of from only forty to fifty per cent. For sales in smaller quantities, however, a much greater return is obtained. The poor devil with only a quarter, draws seven grains of cocaine, a rate of over \$2 a drachm, and one druggist of my acquaintance, doing a lucrative business in "dope," sold four and a half grains of cocaine, adulterated with acetanilid, to a negro woman upon a request for fifty cents' worth, an "earning" of over twelve hundred per cent. Unfortunately this too small package was handed to a user in my employ and, without the formality of a physician's prescription, the vendor's profits receiving a rude offset the next morning in the shape of a hundred dollar fine.

Of those habitues, acquiring their habits through first trying these drugs on the advice of some acquaintance, it is probable that but few would have become chronic users had they lived in communities where laws restricting the sale of opiates, except upon prescriptions, existed and were enforced. The same may be said of many acquiring the desire first through a physician's prescription and of nearly all that began through dissipation, so that we find two principal etiologic factors at work, careless prescribing and improper sales by druggists. I have heard it stated that various patent nostrums were frequently responsible for the creating of drug addicts and it would seem a reasonable hypothesis. It so happens, however, that I have not personally come in contact with any such cases, and am, therefore, not prepared to comment on this aspect of the situation.

One other method which I have included under the general heading "Advice of Friends" deserves separate mention; those who were deliberately induced to try this or that drug by some old user, in order that he might, through these new victims, provide a supply of the drug for himself. In my series of cases this is seen most frequently among those using cocaine and some opium derivative, usually heroin. Indeed, there seem to be no depths to which some of these "combination" users will not descend in order to acquire sufficient funds to provide themselves with the means for existence. We have discovered a number of these "peddlers" who buy one or two drachms at a time and dispense their wares to others, less gifted

with business acumen, at from fifteen to twenty-five cents a dose. No especially difficult problems are presented by this class of offenders as their detection is simply a matter of a little time and patience.

Much more might be told of the sordid details of this drug sickness that is to be found in every community, instances of malpractice of a peculiarly aggravated nature; of physicians who, for a fee of twenty-five or fifty cents, will write a prescription for any amount of any drug without making an effort to discover if the purchaser be really an habitual user. I could name all too many such in my own city and can prove such statements by most carefully obtained and recorded evidence; of druggists whose chief income is derived from the usurious profits of dope sales.

The points, however, which I wish especially to make are, first, the necessity of securing accurate data in each community as to the prevalence of drug habits. I am convinced that, in spite of all that has been said and written of this evil that few public officials are aware of the actual facts. The only persons who really know them are the druggists who cater to this trade and the users themselves. Obviously neither party will supply the information unbidden.

A survey of the true conditions should be conducted and the findings made a matter of public record and information. Not improbably some better method than mine will be devised, one less burdensome is certainly desirable in large communities.

Second, whatever corrective legislation be enacted must take full cognizance of the practising physician as a factor of prime importance in the formation of drug users and not content itself with restrictions thrown around the druggist. The New York state cocaine law recently passed is, I believe, the best as yet devised, but does not cover opium derivatives.

Third, any effective prohibitive legislation must provide for the free treatment of existing users. To deprive them of their supply alone would be inhuman; private institutional treatment is beyond the reach of all but comparatively few, a circumstance probably more fortunate than otherwise, in view of the methods of most such places, and they should be considered a public charge for at least one rational course of treatment.

The state of Iowa has made such provision at Knoxville where dipsomaniacs and drug habitues are received and treated. Commitment is had through application made to the judge of the district court in person by the user or by his family. The third biennial report of this institution prepared by the superintendent, Dr. H. S. Miner, is a most interesting and instructive document—the scheme of conduction of the institution would appear to be a model one which other states might adopt with advantage.

Doctor Miner's tabulations include alcoholics with narcotic drug users so that I am not able to compare my figures with his. He reports 42.44

per cent. of new commitments, as showing satisfactory results after discharge, and comments on the increasing number of voluntary commitments. I am convinced that a very large percentage of my cases would avail themselves of such institutional treatment were it obtainable with us. Many of them have already spent considerable sums in various private institutions and for the so-called "home treatments" so attractively advertised in our daily press. Where one is fortunate enough to fall into honest hands, scores spend their earnings fruitlessly and the only solution would appear to be the public institution.

In conclusion, it seems to me that the whole subject is one which may best be handled by health authorities, municipal, state and Federal. For the most part its control has been left to the police departments and violators of existing drug laws are spasmodically prosecuted, whenever chance or some too flagrant act brings the matter to their attention. In most communities the time of the police department is fully occupied with other matters nor should they be expected to possess such a realization of the profound importance of this subject as must precede and accompany any successful effort at control.

Some months ago I submitted the matter of state institutions and control by health authorities to about forty state and municipal health officials. The replies, for the most part, were to the effect that public institutions were needed and that the problem was one which legitimately belonged to health departments.

I believe that few of those confronting us affect more seriously the public health than this of drug addictions. It directly and indirectly increases the death rate and lowers the birth rate of every civilized community. It closely resembles, in its dissemination, contact infection of disease; in one neighborhood nearly all the users will be addicted to one drug while in another section some other drug will be the favorite. Knowing the address of the applicant, I could prescribe correctly for over fifty per cent. of the users in my city.

We concern ourselves, quite rightly, with other preventable conditions, quarantine our scarlet fever and diphtheria, trace with zeal our typhoid cooks, and tabulate with regret each death from these causes, feeling even some measure of responsibility in their occurrence; yet contributory to how many such records, to our deaths from pneumonia, tuberculosis, our still-births and suicides might be stated, were the truth known, "drug addiction." The social misery, the inefficiency and communal depletion resulting from this civic malady, may not be properly realized by one who has not seen for himself this pitiful array of wrecks waiting, as in a bread-line, for the free dope prescription, wives fearful lest their husbands discover their condition; fathers and mothers hiding by every artifice, a stimulated cunning may devise, their habit from their own children; young men

and women asking in a whisper for a fifty-cent prescription for "coke," a vicious circle of carelessness, ignorance and cupidity involving a responsibility that has been shifted from shoulder to shoulder until no one seems willing to admit it, yet intimately associated with the public welfare, and health conservation and deserving of most careful investigation and expert treatment.

DISPOSAL OF MANURE.

P. M. HALL,
Minneapolis, Minn.

Read before the Section of Public Health Officials, American Public Health Association, Colorado Springs, September, 1913.

In the disposal of manure the cities have thus far shown little progress beyond village methods. Most of the ordinances read provide for some kind of floor construction; for the construction and use of pits, bins or boxes, more or less water tight, with or without sewer connections, screened or unscreened; for the systematic removal at certain definite intervals, varying with the season of the year; et cetera.

That there has been so little progress in the handling of this waste product seems strange, when the fact of its fly-breeding propensities are now almost universally known and accepted, and the dangers of the house and stable fly as carriers of disease so well recognized and received. We have not progressed beyond the consideration of its being a common nuisance, from the odors which arise when it is accumulated or kept in bulk. The dangers from fly breeding have received only such recognition as the purely academic one of making mention of screening the boxes or bins in our ordinances, to let folks know that we are up to date in our scientific knowledge.

In procuring the information for this paper, letters were written to all the principal cities of the United States. The methods were found to be so similar that the reports of only seven cities are here given, as that number will give a sufficient index of what the others are doing.

In Minneapolis, the manure is disposed of through the winter months by the voluntary collection of market gardeners and farmers, but, as soon as spring work opens up, the collection of manure in the city is sadly neglected. Several years ago an ordinance was passed, permitting private collectors between April 1 and October 1 each year to collect manure and charge the horse owner a fee of 50 cents per month per animal. All of the known private haulers in the city, together with the regular scavenger companies, were notified and furnished with copies of the ordinance and for the first year the collecting was fairly well done.

The one great difficulty to contend with was that the collectors found no sale for it, as the farmers and market gardeners did not want it at that time of year and objection was made to its being stored anywhere. The ordinance had the usual requirements of keeping manure in a watertight, screened box; that it should be collected at least once a week between April 1 and October 1; that those hauling it should be careful that there should be no spilling on the street, etc. The ordinance is still in existence and has not been superseded by a new one. It is indifferently enforced.

The reports of the various cities follow:

WASHINGTON, D. C.

The law in force in the District of Columbia requires every person owning or occupying a building within the more densely populated parts of the district, where one or more horses, mules or cows are kept, to maintain in connection therewith a bin or pit for the reception of manure pending its removal from the premises. These bins or pits must be flytight and watertight. The manure must be removed from the premises twice a week between June 1 and October 31, and at least once a week between November 1 and May 31. The manure when transported over the highways of the densely populated parts of the district must be in tight vehicles which, if not enclosed, must be so covered as to prevent the dropping of manure. The methods for collecting the manure from these bins or pits is not uniform, it being the duty of the occupant of the stable to arrange for the removal of the manure. There are in the district six or more companies that deal in manure. Wagons are maintained by them; in some instances exclusively for the collection of manure, in others they are used also in other branches of their business. These wagons collect from the manure bins or pits and convey the manure either to the railroad stations for shipment or directly to the property of the person purchasing it. In many instances these companies pay to those in charge of the stables a small amount for the privilege of obtaining the manure. Some of the farmers residing within the immediate vicinity of Washington collect manure from the stables of the city during certain months of the year. This service, however, has proved unsatisfactory in that the farmers do not call for the manure during the growing season because of the demand for their teams in other work on the farm. The manure from the stables under the control of the municipality is used on the grounds of the municipal workhouse and almshouse and on some of the city's parks.

TORONTO, CAN.

The city has contracts with four different companies for the removal of all manure, which has to be removed from all premises at least once every week. The department of health requires manure to be kept in watertight, flyproof bins or receptacles. If these manure bins extend below the level of the ground, they are required to be constructed of concrete, and connected by a trap to the common sewer on the street.

The companies make a nominal charge to the different stables, etc., for the removal of manure, the department of health insisting on this regular removal. There is, therefore, no cost on the department in connection with this portion of the city's waste.

JERSEY CITY, N. J.

All manure is carted away by private contractors, its storage not being allowed in the city. Most of it is sold to farmers for fertilizing purposes.

RICHMOND, VA.

According to Richmond's health commissioner, Dr. E. C. Levy, more trouble in Richmond in connection with the removal of manure is encountered with the small private stables than with the large livery stables. The latter are able to make contracts for the removal of manure throughout the year, while the small stable owner is not able to do so, and finds the greatest difficulty in getting manure removed during the summer months—the very time when its removal is most important.

Methods of dealing with this problem are now being considered. In the opinion of Doctor Levy, the city itself should be prepared to remove manure from stables when the owner or occupant fails to do so in accordance with the law. Every horse owner should, of course, be allowed to sell his manure if he can do so and in doing so comply with the law; otherwise horse manure should be regarded as a nuisance, and the city, it would seem, would then have a perfect right to come in and remove the manure without compensating the owner and, indeed, going further and charging the owner for the service, if this be found necessary.

ROCHESTER, N. Y.

The city does not collect or dispose of manure. It is considered a by-product which the stable keepers sell to the local farmers. "Personally," writes Dr. Joseph Roby, "I cannot see that it has any particular bearing upon the public health, except so far as the manure pits are breeders of flies."

DENVER, COL.

The present method of manure disposal in Denver consists of transferring it to the city dumps where it is held during the summer months and in the spring sold to market gardeners. The chief sanitary inspector of the department writes that the service lacks much of being satisfactory, and that the methods will probably be improved in the near future.

COLUMBUS, OHIO.

Columbus collects manure from any stable within the city limits on payment of a moderate fee. This then is disposed of by sale to farmers or other parties desiring to use the same as fertilizer. All stable owners in the city are required to keep manure in tight boxes and have the same removed at regular intervals, whether by the city or private individuals. The charge made to the stable owner is very nominal and does not meet the entire cost of collection, which is about \$12,000 per year. "This system has not been in effect any great length of time," writes the acting superintendent of sanitation, F. M. Hoffman, "so we are unable to give any exact observation on its bearing toward public health, but will say that a great many old nuisances have been cleaned up thereby."

The city has also been shipping manure to land owned by the city which

is being cultivated by workhouse prisoners, during the period when there is the least demand for manure.

Quoting from "Reports on Collection and Disposal of Refuse and Garbage" of the Columbus department of public service:

"Previous to April 1, 1912, the city collected free of charge all the manure from the different stables. On February 13, 1912, the council passed Ordinance No. 26245 to regulate the collection of manure. This ordinance provided that if any person or persons desired to have the manure removed from stable or stables, they would be compelled to take out a permit for such service at a yearly charge of \$3 for one horse; \$5 for two, and \$1 for each additional horse. After the ordinance became a law, the department commenced to notify the public that from and after April 1, 1912, no manure would be removed without payment of the fee. Since that date the owners of 976 horses have paid \$1,665 to the city treasurer.

"The sale of manure is a perplexing problem. Between September 1 and June 1, the demand for manure is greatly in excess of the supply, and the city could sell three or four times as much as is collected. June 1 to September 1, there is practically no demand as the farmers cannot handle it during that time. There should be some method devised to store the manure during this period, when by order of the board of health we are prohibited from holding manure within the city awaiting the marketing period. The manure we were ordered to dispose of at once this summer had to be given away at a loss of \$750 to the city.

"The price received for manure is \$1.50 for a wagon load; \$7.50 for a thirty-ton car; \$10 for a forty-ton; \$12.50 for a fifty-ton. These prices are based on coal cars of these capacities, and do not mean these cars hold that much manure. The sale of manure collected (130 car loads and balance by the wagon load) gave the city a revenue of \$4,106.85.

"The collection of manure is made under the following rules: Whenever a person or persons pay to the city treasurer the ordinance charge for manure collection, the department is notified of same on a blank form. The name, address, permit number and number of horses are recorded in alphabetical order.

"Each driver (four being used in the collection) is given a separate list of barns to collect from, and each evening reports the places collected from. The date of each collection is noted in the office record by the clerk. By this method the department is always able to show the date of every collection from each place and to see that collections are made as frequent as necessary."

A detailed statement of the cost of collection and the receipts from the sale of manure collected, follows:

Total number of loads collected (year 1912)	3,720
Total number of tons	7,440
Total number of yards	18,600

Cost of teams and labor	\$7,625 58
Superintendent, inspection	318 82
Repairs and miscellaneous	205 70

RECEIPTS FROM SALE OF MANURE.

Cash paid to city treasurer	\$4,081 35
Cash on hand December 31, 1912	15 00
Open accounts on book for year 1912	10 50
Sale of manure permits	1,664 00

Total	\$5,770 58
Total operating cost	\$8,150 10
Total receipts	5,770 85

Net cost	\$2,379 25
Cost of collection, per load	\$2 19
Cost of collection, per load, receipts deducted	64
Cost of collection, per ton	1 10
Cost of collection, per ton, receipts deducted	32

In Winnipeg, Edmonton and other Canadian cities there is no demand for manure as a fertilizer. The manure, therefore, is incinerated, but how successfully and what cost we have not the figures at present to state.

This gives a general idea of the method of handling manure in cities. No city seems to have developed anything new with the exception of Columbus, Ohio. There the new departure, although in operation only about a year, has proved fairly successful. The plan seems to be right. Manure, being an excellent fertilizer, should be returned to the soil. Being an excellent fertilizer and of some value it should at least return the cost of collection. We have hardly reached the point in the collection of city waste where the cost of collecting manure should be made a charge upon the general public. While the general public will be benefited by a thorough removal, yet the keeping and storing of manure should be classed as a nuisance and as such the cost of its removal should be a charge upon the horse owner. Even as it is, about one third of the manure produced in cities is removed at public expense with the street sweepings.

It may be possible that some new biological knowledge of the breeding habits of the fly may lead up to new methods in disposal. Through the investigations of Doctor Levy of Richmond we have learned a great deal that is new along that line. The fact remains, however, that so long as manure has to do with the breeding of flies it is a menace to the public health.

This paper is offered as a subject for discussion in the hope that something more definite regarding proper manure disposal may be evolved.

CONTROL OF COMMUNICABLE DISEASES.

DR. P. S. SCHENCK,
Health Commissioner, Norfolk, Va.

Read before the Section of Public Health Officials, American Public Health Association, Colorado Springs, September, 1913.

It is the intention of the writer to deal in this paper with the chief obstacles that stand in the way of the control of communicable diseases. While there has been a great change and at the same time great progress made in the last decade in the knowledge, management, control and prevention of this class of diseases, the science of bacteriology and the subservient sciences in the domain of chemistry, physics and the various branches of biology having furnished the "sinews of war," yet much remains to learn, and a number of potential factors still stand in the way of that Utopian period in the mind of the great Pasteur when he said that "It is in the power of man to rid himself of every infectious disease." While this proclamation seemed theoretically true at the time that it was made and is perhaps theoretically true today, still great and almost insurmountable and unconquerable obstacles stand blocking the way against the practical consummation of this end. Typhoid fever, typhus fever, diphtheria, smallpox, scarlet fever, tuberculosis, malaria, rabies, wound infection, cancer, erysipelas, measles and nearly if not all of the contagious and infectious diseases that are engaging our attention today were doing the same thing in the days of Hypocrates and Galen and the doctors in the period of the Pharaohs were battling with them as we at the present century—and during all these thousands of years we have not been able to conquer them. We have been able, however, during the past few decades to prevent many cases of communicable disease through our knowledge of their cause and means of transmission.

Pasteur, great scientist though he was, did not realize and was not aware of the existence of several conditions that a wider and better knowledge and experience in the domain of contagion and infection has demonstrated, and are now known to be prime factors against the consummation of this end. Simon in a very recent work, from which I have already quoted, is even stronger in his statement than Pasteur and says that "we have learned to prevent many diseases by the elimination of the corresponding infecting agents in our midst. Cholera, plague, typhus and typhoid fever, yellow fever, smallpox, malaria, diphtheria and other diseases of this class which, if they still exist among civilized people, do so

with the consent of the people in the face of a full knowledge of the manner of their prevention." This statement is in full accord with the enunciation of Pasteur, and again I say that while both are theoretically true still there are almost insurmountable obstacles to this end, inasmuch as it is practically impossible to search out and locate the carrier, the missed and so-called unrecognized cases, and yet we must find some means of doing this before we can hope to control this class of diseases. To know the cause of a transmissible disease is of inestimable importance—to know the intermediary host and the mode of transmission from patient to victim is of greater moment still; to know both, the cause and the mode of transmission, ought to put us in a position to absolutely control these diseases by carrying out a rigid system of isolation, quarantine, disinfection of discharge, etc., and so it would if it were not for several very serious complications which seem to be beyond our control at the present time.

The first of these complications in importance are the carriers and missed or undiagnosed cases already referred to—cases in which we, knowing the cause of the disease, are not able to locate or control the host, the distributor. This condition is best illustrated in diphtheria, typhoid fever, cerebro-spinal fever and to a less extent in scarlet fever, whooping cough, pneumonia, and perhaps several other diseases where the germs are harbored and distributed and no one the wiser. Who can point these carriers out? What practical method have we for their detection? It is obviously impractical to take cultures from each of a city's population. What then is the remedy? The magnitude of the proposition is apparent when we take in consideration as far as diphtheria is concerned, and it was in diphtheria that the carrier was first discovered. It is estimated that 25 per cent. of the attendants upon diphtheria cases harbor the bacilli, 25 per cent. of the family who have been exposed carry the germs, although they may give no manifestation of the disease. In schools in which diphtheria has prevailed among the children to any extent from 8 to 10 per cent. carry the germs. In the tenement and crowded districts, particularly of the large cities, it has been demonstrated that about 10 per cent. of the children are carriers. In cultures taken from school children, when diphtheria is not prevailing, 2 per cent. have been found to be carriers and about 5 per cent. of all cases that have been down with the disease continue to be carriers after their discharge.

In my own investigations in Norfolk, being struck, as doubtless all health officers are, at the increased incidence of diphtheria immediately following the opening of the schools in the fall, I caused last year an examination of all school children before entering the school. A force of twenty-two physicians and as many nurses were sent to the various schools and the children were taken one at a time in an examining room; cultures were taken from every throat that presented the least suspicion. I would

like to have taken cultures from every case, but there being some 12,000 children, this was impracticable, with the force and equipment at my disposal, so cultures were taken only from those cases that seemed most suspicious. We took cultures from 108 cases, twelve of which proved positive, showing the presence of the Klebs Leoeffler bacilli—eight of the cases proved to be virulent upon the inoculation of guinea pigs. All of the 108 suspicious cases were kept from school pending the result of the bacteriological examination. We had fewer cases following this procedure among the children last winter than for several preceding terms. Some of the precautions that I would recommend in view of the conditions above outlined are that cultures be taken from the throats and noses of all school children at the beginning of the fall term if practicable, certainly from all that present symptoms at all suspicious. That cultures be taken from the family and attendants in all cases of diphtheria. That at least two negative cultures be taken from all cases—from both throat and nose—on alternate days before release, and thorough terminal fumigation; wash up quarters following by sterilization under steam of all clothing, bedding and paraphernalia in sick room and the usual routine precautions carefully followed out as is customary by all modern health departments, such as immunizing doses of antitoxin to those exposed, supervision and surveillance of the family as far as their movements are concerned, etc.—all detected carriers, of course, to be cured and at least two general examinations made of all school children during the school term and a careful education of the children by the inspectors as to the method of transmission, the danger of mouthing articles, swapping pencils, etc.

With reference to the use of immunizing doses of antitoxin, we must impress upon the profession the fact that the immunity granted by antitoxin is of short duration, perhaps not longer in most cases than two or three weeks, and if the exposure is repeated or prolonged that a second or a third immunizing dose should be administered; the importance of this is demonstrated in my own department where, notwithstanding we give antitoxin free, I do not recall a case in which a second immunizing dose has been called for. As to the restrictions to be put upon members of the family as far as their liberty is concerned, I am of the opinion that those members of a household in which there is diphtheria, whose duties require contact in close quarters with large numbers of children, should be restricted, as teachers in schools, clergymen and others who are thrown intimately in contact with any great number of children.

With regard to typhoid fever with an incidence of 300,000 cases and a death-rate in the United States of some 30 to 35,000, or an average of 46 per cent. per 100,000, as against Germany with 7.6 per cent. per 100,000, and England with 11.2 per cent. per 100,000 and many other European countries running as low as 3 per cent. per 100,000, with 3 per cent. of the

cases terminating in carriers, it is high time that we take more aggressive and active precaution to mitigate this terrific death toll, and, at least, put our country on a par in this particular with the best countries of Europe. Why wouldn't we? Are we less intelligent, less interested, or haven't we the energy? My suggestions are in typhoid—other than the careful isolation, quarantine and routine treatment of cases—a more careful investigation of the history of each and every case, in an endeavor to locate the source of infection; a more efficient supervision of our milk and water supply; more rigid food inspection and screening; a more careful and thorough supervision of the disinfection of the discharges from the patient. We placard typhoid, fumigate and sterilize. Release fecal cultures in all cases.

We have adopted this plan in Norfolk using the Stokes-Stoner outfit for this purpose, and an earnest effort made by the health officials to induce as many people as they can reach to take typhoid vaccine, and a united and concerted effort upon the part of all people, regardless of position or calling, to correct the colossal communal crime of our times; to put a stop to the wholesale slaughter of our people by the universal contamination and pollution of the waters of the nation by sewage, the custom in this country being to supply its people with diluted death-dealing sewage for drinking purposes. One of the wisest precautions would be to regard every person for a time after his recovery from typhoid as a potential carrier and to instruct him fully as to the dangers of spreading the disease; teach him and insist upon a thorough disinfection of the discharges from the bowels and bladder and also his hands after toilet. These patients should not be permitted to handle food of other people, particularly cooks, waitresses, waiters, soda fountain attendants and others of this class, until we are absolutely sure that the case does not terminate in a carrier.

Cerebro-Spinal Fever. From investigations and studies made by Elser & Huntoon and by Meyer & Greebar they concluded that in cerebro-spinal fever as in diphtheria and typhoid, carriers played a very important part in spreading the disease; in fact their conclusions were that the disease was spread principally by carriers who gave off the meningococcus in the secretions of the nose and throat. Many investigators are of the opinion that in an epidemic there are far more carriers than there are cases. The great difficulty then in the control of cerebro-spinal meningitis is the recognition and control of the carrier—the most important factor in the dissemination of the disease.

Measles. The one great obstacle in the way of the control of measles is that the disease is communicable in the preëruptive stage, before a diagnosis can possibly be made. It is, therefore, impossible to handle epidemics with any degree of success, because children attend school,

motion-picture and other shows and many other public gatherings, disseminating the disease broadcast, before anyone recognizes that trouble is brewing. The best we can do is to isolate the cases when we can get them, prohibit other children in the same house from going to school or other public places and educate the public that they should isolate all children during an epidemic that presents the first symptoms that point in any way to an approaching case of measles.

In scarlet fever—not knowing with certainty either the precise cause or mode of transmission, although it is pretty well settled that the virus is contained in the secretions of the nose and throat and is probably streptococcus—strict isolation and quarantine as long as there is any abnormal discharge from the nose, throat and ears or suppurating glands, and a thorough disinfection of all discharges from the patient is about the best we can do in the light of our present knowledge, although some observers claim to have gotten excellent results from streptococcus vaccine.

In smallpox we are again confronted with a lack of knowledge with regard to the cause and mode of transmission, but we have in vaccination a prophylactic of absolute certainty, provided it is properly done, and repeated before susceptibility is again established.

The failure here in the control of smallpox is due absolutely to the carelessness of physicians, patient or family. If all children were successfully vaccinated during the first year or two of life, again about the seventh or eighth year and again upon maturity and vaccinated immediately after every known exposure, smallpox would in a decade or two disappear from the face of the earth, but the great trouble is that physicians will so often carelessly vaccinate their patients and never investigate as to whether it was successfully done or not. It goes without saying, of course, that all cases of smallpox should be rigidly and intelligently handled as far as isolation, quarantine and terminal cleaning up is concerned.

In whooping-cough there is a woeful lack of supervision and precaution. It is almost impossible to isolate and confine a child, especially with a mild case of whooping-cough, in the house eight or ten weeks, but we could prevent the child from associating with other children, and every case that is permitted to go at large should bear upon breast or arm a notice to other children that the child has the disease and warning them to avoid immediate or close contact.

Pneumonia should be regarded as a communicable disease; should be reported and placarded and should be avoided especially by those having colds, inasmuch as they are thus rendered more susceptible. All discharges from the respiratory passages should be immediately disinfected.

Time will not permit a discussion of all communicable diseases. Most of the precautions indicated in those mentioned are more or less applicable to all diseases of the class.

Rosenau says that the most important advance made in the last decade, in the domain of preventive medicine, is the establishment of the fact that most all communicable diseases must be dealt with as an infection spread by man to man; that man is man's greatest foe in this regard and is himself the great source and reservoir of human infection, which makes the problem even more difficult to handle satisfactorily inasmuch as man himself is the one animal most difficult to control.

There are still a few superstitious fatalistic foolish people, who pretend, at least, to believe that all sickness and death is directly in the hands of God and dealt out by Divine dispensation as a punishment for sins, and, therefore, do what we will are unavoidable. We have to try to counteract this phase of mental delinquency by education, but persons who hold such views in the twentieth century are well-nigh hopeless and perhaps if we save them to propagate their kind we do more harm than good.

Moreover, we have to contend against the insincerity and the lack of earnest coöperation of a certain class of physicians. It is almost a daily experience in my department, and I am sure that all health officers are confronted with the same conditions, where physicians will advise the families and patients along lines directly antagonistic to the policies of the health department. They say that we are faddish and hobby riders and that this, and that, is not at all necessary, and assisting the family and patient to evade, violate and set aside, the rules and regulations of your department to the detriment of the public at large. I had a physician in Norfolk only a few days ago, who appeared in court in the interest of a man whom I had had arrested for refusing vaccination after an exposure to smallpox in his own house. The doctor testified that the man's blood was in bad condition and contra indicated vaccination, and in his opinion the health department should be required to obtain certificates of health from the family physician of all people before vaccinating them, in spite of this, however, we fined the man \$25 and vaccinated him before he left court. I am glad to say that we haven't many doctors in our community that do not coöperate with the health department, but there are some, as there are in every community, and they do great harm to the progress of your preventive work.

Inefficiency of departments of health in the small cities, towns and counties.—My allusion to the inefficiency of the health departments of the small city, town and county is not offered in the spirit of unfriendly criticism. I know of very able sanitarians and physicians who are health officers in these places, but they are handicapped by lack of authority, funds and material, to properly carry out their work. Many of them are directly under the control and authority of county or town supervisors, composed of laymen, who do not know, or realize or haven't faith in prophylactic work. They look upon every dollar spent as money devoted

to charity pure and simple, with absolutely no returns. One of the first duties of a health officer is to convince the "powers that be," those in authority, that hold the purse strings, that fighting disease, particularly communicable disease, is a paying investment, yielding large returns in dividends of health and human efficiency and progress upon the time and money spent; direct their minds away from the single humanitarian view, because you are dealing generally with hard, cold business men who are trained and educated to demand direct returns for labor and capital invested—this applies to all communities, large and small alike.

DIRT SEDIMENT TESTING — A FACTOR IN OBTAINING CLEAN MILK.

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It is a well-established fact that filth in milk is, as a rule, associated with bacterial contamination. These bacteria are introduced into the milk by means of the particles of dust, manure, skin, hay, and feed to which they are attached, and milk thus contaminated may become a serious menace to health. Thus septic sore throats, tuberculosis, diarrhoeal diseases of infancy, dysentery, typhoid fever, etc., have been placed to milk and large epidemics of some of these diseases have shown the necessity of insisting upon the production of clean milk. Pasteurization will, it is true, destroy the specific disease bacteria, but it cannot make dirty milk wholesome. While a large proportion of the dirt may find its way into the milk from unclean cows, dirty or dusty barns, it must not be forgotten that some of it may be derived from the utensils into which the milk is placed, from the machinery through which it passes, and from unclean hands or clothing of those who handle the product. The insoluble dirt in milk can readily be estimated by straining through cotton or by the use of the centrifuge, while the soluble dirt passes through the cotton and may reveal its presence by a uniform discolorization.

RELATION OF AMOUNT OF DIRT TO NUMBER OF BACTERIA.

Some forms of dirt, like coal dust, are almost sterile, while others, like manure, are alive with bacteria. A large number of examinations have shown that the amount of dirt approximates the number of bacteria in fresh unfiltered milk tested at the time of production. Bacteria rapidly reproduce themselves in milk kept at a temperature above 50° F., so that a fairly clean milk according to the sediment test may, after twelve or more hours, have a high bacterial count. Any admixture of old milk or careless handling or straining through unclean materials may add millions of bacteria to milk which was originally of the best quality.

Milk which has not been strained previously through cotton or close filters, may be tested for the amount of sediment which it contains. This testing may be done at the creameries and affords a rapid way of ascertaining approximately the amount and character of the contamination to which the milk has been subjected at the time of milking. The use of the sediment test in the city will show the original dirt, plus the contamination which it may have acquired during the process of handling, at the creameries or bottling plants.

Numerous methods have been devised during the last fifteen years but no one method has as yet been generally adopted.

METHODS OF OBTAINING SEDIMENT.

The methods of obtaining the sediment in milk may be divided into two groups:—

Group 1. Sediment obtained by gravity filtration.

Group 2. Sediment obtained by centrifugalization.

Group I. (a) *Type in which the sediment is obtained by gravity filtration.*

Conn's Filter Paper Method.

The Lorenz or Wisconsin Tester.

The Stewart Tester.

The Gerber Tester.

The Schroeder Tester, or Multiple Filter.

(b) *Type in which pressure or suction is used.*

The Lorenz Improved.

The Wizard.

The Gooch Crucible.

Group II. *Type in which the sediment is obtained by means of the centrifuge.*

The Babcock.

The Gerber.

The Stewart Slack.

Conn's Centrifugal Method.

CONN'S GRAVITY FILTER PAPER METHOD.

By this method the sediment is obtained by allowing the milk to stand several hours. After the removal of the supernatant milk, salt solution is added and the sediment washed. This procedure is repeated a number of times, and the sediment is finally collected upon dried and weighted filter papers. Finally the paper with the sediment is dried and weighed and the amount of sediment estimated.

THE LORENZ MODEL OR WISCONSIN DIRT TESTER.

The Lorenz Model or Wisconsin Dirt Tester (see Fig. 1) is composed of two cylinders made of copper, one within the other. The outer cylinder has a narrow piece of tubing fitted into the lower portion which is so arranged that it may be connected by means of rubber tubing with a hot water supply.

The water jacket was found necessary owing to the fact that cold or icy milk does not filter rapidly. Under these conditions there is apt to be a deposit of cream upon the surface of the cotton. This cream not only

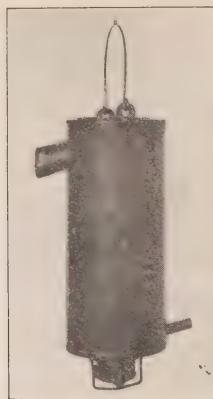


Fig. 1.—Lorenz Model Dirt Tester. (Courtesy of Lorenz Model Co.)

interferes with the passage of the milk, but with a proper estimate of the amount of dirt sediment.

When the filter is to be used, a disc made of absorbent cotton is placed within the cap. The inlet tube is attached by means of rubber tubing to a hot water supply and the space between the cylinders is filled with hot water which flows off through the upper outlet. A pint of milk is poured into the inner cylinder and is filtered through the cotton.

STEWART TESTER.

The Stewart Tester consists of two or more straight tubes fitted with strainers at one end. These tubes pass through a metal box. The air in the interior of the box is heated by means of an alcohol flame which warms the tubes holding the milk.

THE GERBER TESTER.

The Gerber Tester is shown in Fig. 2.

It consists of a cylinder with sloping sides fitted with a special cap at its

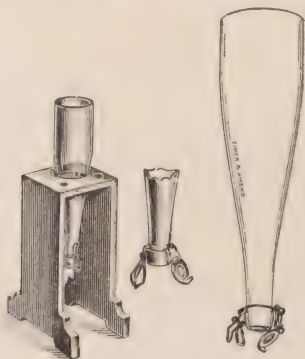


Fig. 2.—Gerber Filter. (Courtesy of Eimer & Amend.)

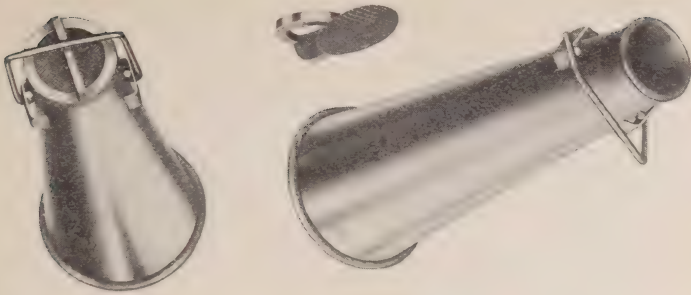


Fig. 3.—Individual Testers, Schroeder Filter. (Courtesy C. Vail.)

narrowed end. The sample is poured into the container and this is then set in the rack.

THE SCHROEDER FILTER.

The Schroeder Filter is a modification of the Lorenz Filter and is adapted for use in creameries where speed is an essential feature of the work.

It consists of a series of individual testers.

A hot water tank or jacket.

A lamp for heating the water.

A reservoir or carrying case.

The individual tester consists of a seamless cylinder of spun copper and fitted at the narrow end with a skeleton brass cap containing the brass disc and held in place by a copper catch (see Fig 3).

The hot water jacket is a covered box-shaped tank having ten cone-shaped, hollow cylinders passing through its entire depth for the reception of the

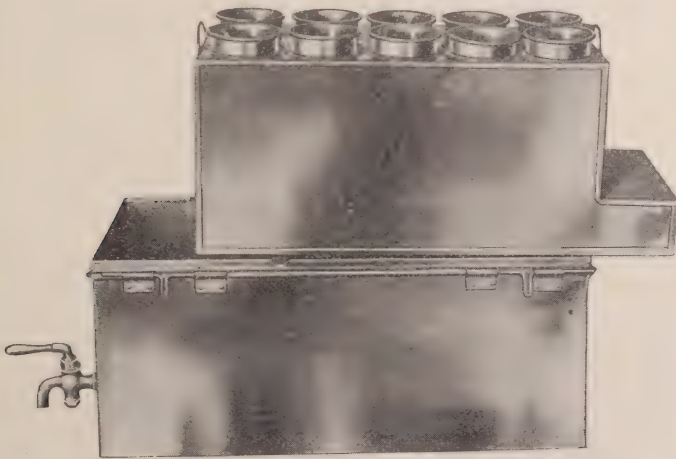


Fig. 4.—Water Jacket for Schroeder Filter set over carrying case or reservoir. (Courtesy of C. Vail.)



Fig. 5.—Carrying case and reservoir for Schroeder Filter. (Courtesy C. Vail.)

individual testers. It is provided with a water inlet and outlet and a steam vent. A covered extension serves for the direct application of heat. A movable brass bar is fastened to the under surface to act as a support for the jacket when the tester is in use (see Fig. 4).

Lamp for use with the tester. The alcohol lamp consists of a powerful burner, regulated by a screw, so that the flame may be raised or lowered and a larger reservoir for alcohol. The reservoir is fitted at each end with a shoulder piece having a turned edge upon its upper side. This edge

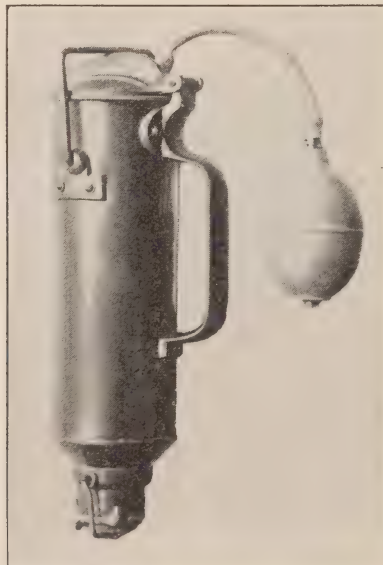


Fig. 6.—Improved Wisconsin Tester. (Courtesy of Lorenz Model Co.)

slips over the corresponding ridge on the extension and holds the lamp in place when the apparatus is in use.

Carrying case or reservoir (see Fig. 5). The case is made of light copper. The cover is hinged and closes anteriorly with a copper wire bolt as shown in the illustration. For convenience in carrying, a leather handle is attached to the cover by reinforced metal strips. The case also acts as a reservoir for the milk flowing through the filters. The milk is drawn off through the small detachable faucet shown in the illustration, directly into a milk can. This can may be set in a box of ice, thus cooling the milk and obviating any loss of the product.

It is easily adaptable for use in large dairies or creameries and can be

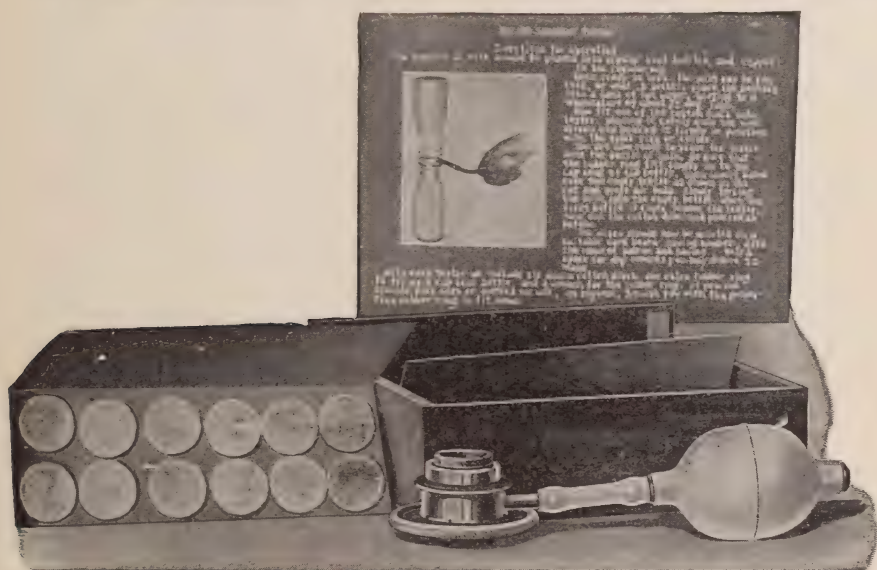


Fig. 7.—Wizard Tester. (Courtesy of Creamery Pkg. Co.)

made a permanent fixture. In this case, the cups may be made quart or pint size and numbered. The hot water jacket may be coupled up with a steam jet and the reservoir connected with the receiving vat or mixing tank. If the apparatus is placed in the receiving room, the milk may be taken from the cans of the individual dairymen as they deliver the milk and then poured into the numbered cups. The milk filters through into the reservoir and may be drawn off from time to time and thus no loss or waste entailed. By the time the last dairyman has delivered his milk, the other samples have passed the filters and all the cottons are ready for comparison with the gauge. This apparatus was devised with the hope of making the testing for dirt more practicable, is not patented and can be made by any who desire to manufacture it.

TYPE IN WHICH PRESSURE OR SUCTION IS USED.

Wisconsin Improved Tester. This filter is similar to the Lorenz Model shown in Group I with the addition of a close-fitting lid and pressure bulb, but without the water jacket. The pressure increases the rapidity of the flow of the milk (see Fig. 6).

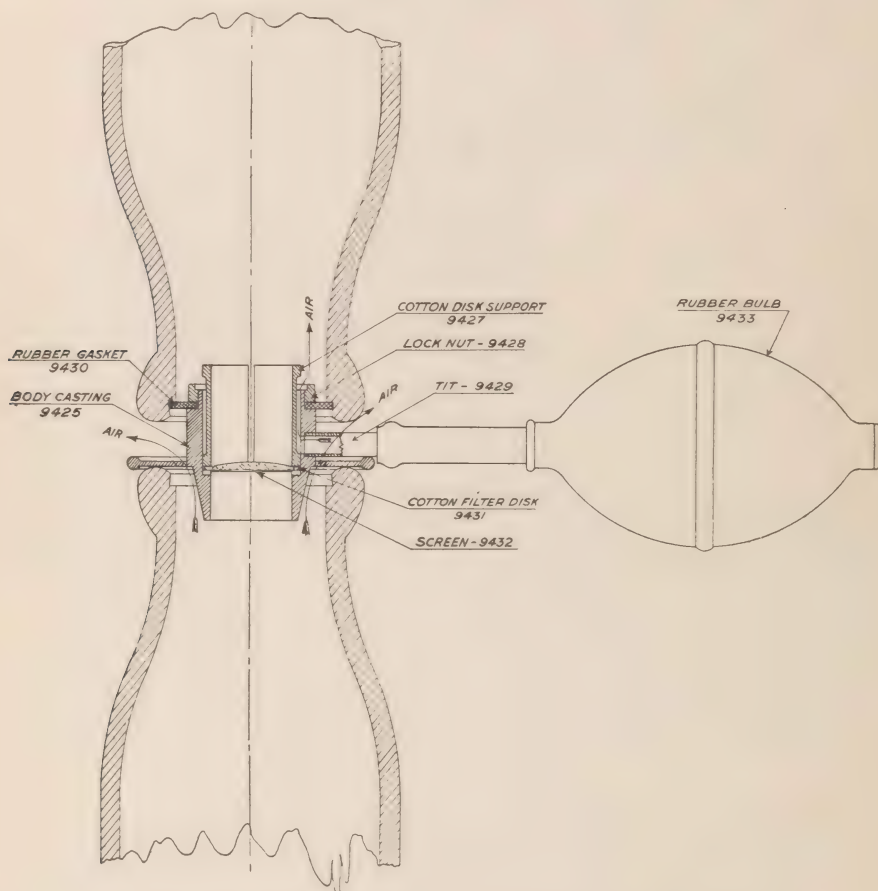


Fig. 7a.—Diagram of Wizard Tester. (Courtesy of Creamery Pkg. Co.)

The Gooch Crucible Filter. A cotton disc is placed inside the Gooch Crucible and the crucible set in the neck of the Woulf bottle. The side-arm is then connected with a pressure pump and the milk is poured into the crucible and drawn through by means of suction.

The Wizard Tester is useful in ascertaining the amount of sediment in milk as offered for sale (see Figs. 7 and 7a). The air pump is necessary to prevent the development of a partial vacuum. (7a shows a diagram illustrating the parts of the tester.)

TYPE IN WHICH SEDIMENT IS OBTAINED BY MEANS OF THE CENTRIFUGE.

Considering the second group briefly, we have

1. Babcock Method.
2. Gerber Method.
3. Stewart-Slack Method.
4. Conn's Centrifugal Method.

The Babcock Tubes (see Fig. 8) are intended for use in the Babcock machine. The tube, as a whole, consists of three parts:—glass tube, glass tip and wooden bushing. The tube proper is open at both ends, with one end carefully ground to receive the glass tip; a wooden bushing covers the lower portion of the tube enabling its adjustment to the brass cup of the tester.

After the milk has been centrifuged, the tube is removed from the centrifuge and the amount of sediment is read directly from the tube.



Fig. 8.—Babcock Tubes. (Courtesy of Biesieker & Co.)

The Gerber Method is also one in which the milk is centrifuged and the amount of sediment is read directly from the tube.

The Stewart-Slack Method consists in the use of small glass tubes, open at each end. The lower opening is closed with a small rubber stopper. The tubes are filled with milk and placed in a special centrifuge disc and then centrifuged. The dirt is thrown upon the rubber stopper and adheres thereto when the stopper is withdrawn.

Conn's Centrifugal Method. A definite quantity of milk is centrifuged and after the dirt has thus been sedimented, the supernatant milk is removed by means of a pipette. The sediment is washed and collected upon dried and weighed filter papers which are again dried and weighed, and the amount of dirt determined. To obtain the moist weight, it is necessary to multiply the figures obtained at the end, by a certain factor which will reduce it to the weight of ordinary moist material. This, of course, will be a variable one, according to the material of which the dirt is composed but a rough approximation may be obtained by multiplying the dry weight by the factor of 7 which will produce a result not very far out of the way.

USE OF THE TEST FOR SEDIMENT IN MILK.

In order to determine how much the sediment test was being used and what value was placed upon the test, a questionnaire comprising a number

of questions was sent to health officials of cities, to agricultural stations and to milk dealers throughout the country.

Do you use any test for ascertaining the amount of dirt in milk? If so, what type? How often?

Where is milk tested, at creameries as received from individual dairymen, or city plants, railroad stations, wagons, etc.?

Do you grade the amount of dirt found and are the results recorded and posted up so that the dairymen may see how their milk runs?

Of what value do you consider the test?

In response, we received 106 replies and the results are shown in Table I.

TABLE 1.
TABULATION OF REPLIES RECEIVED.

	Replies Received.	Using Test.	Not using Test.
Health Officials.....	36	30	6
City Milk Dealers.....	29	9	20
Dealers not in New York City.....	37	18	19
Not Signed.....	4	—	4
Totals.....	106	57	49

Of the total number of replies received 57, or 53.7 per cent. of the writers, state that they are using the test, 46.2 per cent. are not using the test. Among this number are some who are making preparations to use the test, being convinced of its value.

The replies in detail are given in Table 2.

While the replies from the questionnaire were being received and tabulated, the methods used in sediment testing were subjected to a critical study to see if any changes were required in the tester used by the Department and also to formulate some plan to make the testing of milk and recording of sediment cottons available for all creameries shipping milk to New York. A large milk company placed one of its creameries at our disposal and experimental work started in the latter part of July, 1913.

The results obtained are given in the succeeding paragraphs.

TEST TO ASCERTAIN THE FACTORS INFLUENCING GRAVITY FILTRATION.

In this experiment, 416 samples of milk were tested. The points considered were the temperature, the time the milk took in passing through the filter cotton, the amount of fat and the total solids. The temperatures most favorable to filtration were from 40 to 80°. An analysis of the time element gives the results shown in Table 3.

Dirt Sediment Testing

59

TABLE 2.
TABULATION OF RESULTS OBTAINED FROM QUESTIONNAIRE.

Number of Question.	Question.	Replies.	Total.
1.	Do you use Sediment Test?	Using test 57 Not using test 49	106
2.	Type of Tester.	Wisconsin 21 Wizard 10 Stewart-Slack 2 Gerber 1 Babcock 1 Stewart 1 Gooch Crucible 3 Schroeder 3 Jones 1 Not stated 6 Miscellaneous 8 —	57
3.	At what places is milk tested?	Tested at country creameries 32 Tested at city plants 18 Tested at wagons 1 Tested at railroad depots 1 Tested at stores 1 Not stated 4	57
4.	Regularity with which test is used?	Testing daily 10 Monthly 13 Testing weekly 5 Bi-monthly 3 Testing bi-weekly 2 Quarterly 1 Testing bi-yearly 1 Testing at irregular intervals 9 Not stating action taken 13	57
5.	Concerning the grading of the sediment.	Number grading sediment 13 Number not grading sediment 30 Number not stating action taken 14	57
6.	Tests recorded.	Number recording results 34 Number not recording results 7 Number not stating action taken 16	57
7.	Anent the posting of results.	*Number posting results 21 Number not posting results 22 Number not stating action taken 14	57
9.	Concerning the value of test.	Number stating that middlemen, shippers and dairymen were notified 43 Number considering test of good value 37 Number considering test of slight value 1 Number considering test of no value 2 Number not stating opinion but using test 17	57

*A number considered it unwise to post results owing to competition.

TABLE 3.

TABLE SHOWING RAPIDITY OF FLOW OF MILK THROUGH FILTER COTTON.

46 or 11.0%	filtered through the cotton in less than 1 minute.
287 or 68.9%	filtered through the cotton in from . 1 to 3 minutes.
31 or 7.4%	filtered through the cotton in from 3 to 5 minutes.
18 or 4.3%	filtered through the cotton in from 5 to 10 minutes.
17 or 4.0%	filtered through the cotton in from 10 to 60 minutes.
17 or 4.0%	filtered through the cotton in over 60 minutes.

It will be seen that over 87 per cent. of the samples filtered through the cottons in less than 5 minutes.

Judged from the data obtained from the chemical tests, the filtration process did not seem to be affected by the fat content, total solids, or the amount of sediment present in the form of visible dirt. A large excess of leucocytes or epithelial cells tended to retard the filtration.

A number of tests were made on colostrum and stripper milks, but we found that these milks, as a rule, filtered through quite readily.

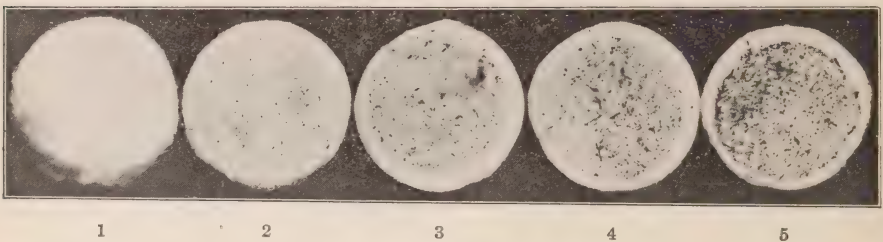


Fig. 9.

According to Baer, the sediment test may also be applied to cream. His method is to dilute the sweet cream with an equal amount of warm water. In testing sour cream, it is necessary to dissolve the curd. This may be done by the addition of an alkaline solution made by dissolving a small can of lye in 2 quarts of water; when cool, the mixture is strained, bottled and corked. The amount of solution necessary is determined by the acidity of the sample. Cream having 0.5 per cent. or 0.6 per cent. acidity, will require about 30 cc. of the solution. Sour cream must be diluted in the same manner as sweet cream.

METHOD OF READING RESULTS OF FILTER TEST.

Owing to the difficulties of making comparative readings of the amount of sediment collected upon filter cottons, gauges have been devised. The one elaborated by us is shown in Fig. 9. This gauge represents the amount of dirt obtained by filtering liter lots of milk to which had been added

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No. 1. represents the cotton filter after the passage of clean milk.
No. 2 represents sediment from fairly clean milk.
No. 3 represents sediment from moderately clean milk.
No. 4 represents sediment from dirty milk.
No. 5 represents sediment from excessively dirty milk.

[illegible]

Fig. 10.—Special Record Blank used for Recording Results of Tests.

PREPARATION OF SEDIMENT COTTONS FOR PERMANENT FILING.

After the cottons are removed from the filter, they are placed upon white blotting paper and sprayed with a strong solution of bichloride of mercury. Good results are obtained by using an ordinary throat spray. The cottons are then allowed to dry. This drying process may be hastened by placing them in a hot-air oven at a low temperature carefully protected from dust and flies.

When dry, they may be compared with the gauge, the results recorded and cottons deposited in paraffin envelopes for filing.

If desired, the dry cottons may be dipped into very hot paraffin. The hot paraffin gives a thin coating and a permanent preparation may be made in this way. Forceps must be used to hold the cottons while dipping them into paraffin.

METHOD OF RECORDING THE TESTS.

A number of cities and dealers have various ways of bringing the results of the tests to the attention of the dairymen. Some simply place the filter cottons upon board, and hang this so that each farmer may see the result of the test of his milk.

Description of Board. A smooth board is chosen and painted white and moulding is attached to three sides so as to form a frame and groove. The groove is intended for the reception of a glass plate. The surface of the board is divided into spaces having an area of 2 square inches. These squares are numbered with the patron's number and serve for the reception

*Department of Health
The City of New York*

Creamery of _____ *Date* _____

Operator _____

Gr. Back. Secs _____ *Gr. Sediment Secs* _____

Sample taken *Am* *Am* *Air Temp.* *Fahr°*

<i>Name</i>	<i>Soil mud etc</i>	<i>Ice used</i>	<i>Filter milk</i>	<i>Temp</i>	<i>Sample no.</i>	<i>Sed. mud</i>	<i>Residual count</i>

Front.

<i>Name</i>	<i>Soil mud etc</i>	<i>Ice used</i>	<i>Filter milk</i>	<i>Temp</i>	<i>Sample no.</i>	<i>Sed. mud</i>	<i>Residual count</i>

Back.

Fig. 11.—Card used for Recording Data Obtained in Country.

of the cotton from the test. The cotton is attached by means of a tiny tack or mucilage. The glass is then slipped into the groove, and serves to protect the cottons from dust.

Others attach the filter cottons to cards and send them to dairymen with admonitions. A sample letter and card are shown.

AUBURN, MAINE.

Dear Sir:

We enclose a cotton disc containing the dirt strained from a half pint of your milk. If the question of dirty milk were simply one of appearance, a finer or thicker strainer would solve the problem. But each particle of dirt falling into the milk carries with it a great number of bacteria which multiply very rapidly in warm milk. These bacteria cause the changes which occur in milk. Clean milk keeps longer than dirty milk because it con-

tains fewer bacteria. The solid dirt in milk can be strained out, but bacteria are still left behind to do their mischief. Consequently, the remedies for dirty milk are clean cows (the most important—three quarters of the dirt comes from the cows), clean tie-up (tight ceiling over tie-up to keep the chaff from falling), careful handling, etc.

Your milk will be examined again and report sent.

Respectfully,

TURNER CENTRE DAIRYING ASS'N.

SAMPLE CARD

This represents the sediment in one pint of your milk received on

.....

clean

fairly clean

dirty

filthy

Remarks

.....

.....

.....

.....

THE BELLE-VERNON MAPES DAIRY CO.

One Health Board cuts the discs in half and retaining one half, sends the duplicate to the dairyman delivering milk.

METHOD OF RECORDING RESULTS.

The cottons may be pasted into a loose-leaf ledger and thus a permanent original record kept of each test and the improvement or deterioration noted, or the results only may be entered upon an individual card and indexed. They may be also numbered and filed in thin metal trays.

The method used by New York City at present is as follows:—

The country inspector visits the creamery and takes one pint of milk from each patron. The milk is then subjected to the filter test. The cottons are sprayed with a strong solution of bichloride and partially dried.

The tests are then cut in half, one half is left with the creamery manager, the second half is placed in a small glassine envelope.

The small envelopes are then placed in a stout manila envelope and together with the special record sheet (see Fig. 10) sent by mail to the Bacteriological Laboratory for comparison with the gauge and recording the results. The Inspector also secures the data shown on the card illustrated

12 F—1912

22-130, '12, 25,000 (P)

Department of Health, The City of New York
DIVISION OF FOOD INSPECTION

Date.....Time.....A. P. M. Air Temperature.....
 Inspection No.....Sample Nos.....
 Taken from.....Business.....
 Address.....Store. Wagon. Permit No.....
 Shipped from.....Taken at.....
 How Labelled.....
 Pasteurized.....Where.....Time.....
 Containers and Utensils Clean.....Containers Sterilized.....
 Containers Sealed.....How Iced.....
 Samples Delivered at Laboratory.....

Inspector of Foods (Milk)

Front.

Taken from	Quality Grade	Shipped from Creamery	Temp.	Sample Sediment Number	Bacterial count

Examined by.....Approved.....
 Bacteriologist Director of Laboratories
 Remarks.....

Chief Inspector Division of Food

Back.

Fig. 12.—Card used by City Inspector.

(see Fig. 11). The Inspector who makes the sediment test in the city, records his data on the small card shown (see Fig. 12),—these cards may also be used if bacterial samples are to be taken in conjunction with the sediment test.

In closing, I wish to thank Dr. William H. Park, General Director of Laboratories, for the many helpful suggestions and kindly interest which has made this work possible.

For assistance in the technical work, I am indebted to Dr. Southerland and Messrs. Lowy and Britton.

MODERN HEALTH ADMINISTRATION: AN ANALYSIS.

(Abstract.)

DR. OSCAR DOWLING,
President Louisiana State Board of Health.

Read before the Section of Public Health Officials, American Public Health Association, Colorado Springs,
September, 1913.

The organization, functions, methods and activities of health boards as a unit of the public service is a pertinent and fruitful topic.

The present system is an inheritance from the old order. In common with many other features of governmental and social administration, it is at present a target for the student critic interested in human progress.

The form of municipal government, which heretofore met the public demand, is rapidly passing; the cumbersome bicameral law-making assembly of the state is a point of attack; even the unwieldy National Congress is considered unsatisfactory.

Health departments as organized belong to the day when the science of medicine was yet in swaddling clothes. Members of boards are selected to meet the wishes of the dominant party. Fitness, training, efficiency, do not count when weighed in the balance with the fourth-ward boss or the leader of the eighth district. The most loyal party man in theory will agree that school and health officials should be chosen on a basis of qualification for the work; yet when appointments are considered, to the victor the spoils is the policy and there is no headway toward reform.

The limitations of the board system are apparent to all. The members without unity of thought or purpose, perhaps without authority to select their own executive, cherishing it may be petty personal animosities or private ambitions, rarely unite in a clearly defined policy. Slow progress if progress at all, is the logical result.

With the evolution of a better system in public affairs, the need of boards is passing. The supervisor of public accounts ensures financial accuracy in every department. It is also clear that in emergencies the executive officer must take the initiative almost always on his own responsibility; likewise, he must bear the consequences.

Where effective health work has been accomplished under this régime, the executive officer, almost without exception, has been allowed to carry out his own policy and has been upheld by the other members of the board whether they approved or not. In this the management virtually is according to the science of modern business. Health experiments, pre-

eminently successful in other parts of the world, have been planned and executed by a governmental appointee having full authority. Where responsibility is placed definitely, fitness or unfitness, efficiency or non-efficiency, success or non-success become apparent; reward or remedy, likewise. For this most important branch of public service, a composite selected in return for political courtesies is as archaic in business management of today as the stage coach would be in transportation, or the hand loom in the manufacture of cloth.

Equal in importance with definiteness of responsibility is adequate power. For effective work, the health officer must be able to invoke the strong arm of the law. Whether the power be in the form of regulations as binding as statutes or specific enactments by the legislative body covering all practical phases of his work, matters little. The main point is adequateness. No imperative health measure should be delayed; no specific necessary activity rendered ineffective from lack of authority. Too often the welfare of a community depends upon prompt action; it may be legal procedure. Delay may mean dire calamity. The officer, who can be trusted with the direction of the department, can be given the authority.

In the growing tendency to analyze inefficiency in public administration, the functions of the health department are considered debatable. Every experienced officer realizes the distinction between the work which pertains to health and that which relates merely to comfort or convenience. This differentiation will depend ever on local conditions. Effort that is an essential in one community may be neglected with impunity elsewhere. Further, there can be a differentiation in the work, placing under police and other municipal departments certain features now controlled almost universally by the health authorities. In many cities this system obtains in reference to abatement of nuisances, collection and disposal of garbage and other features which pertain more to convenience than to health. This, too, must be solved by the local unit. Because of laxity in management it is wise at present that correlative lines be under the supervision of the department of health. The possibility that conditions, indirectly a menace to health, may become directly so must be taken into consideration and in the interest of effective control at a critical moment the responsibility should lie with the board of health.

If funds are adequate for these activities and those that are essential, at present, state and local boards should be charged with entire supervision. But if in the expenditure there should arise the question of prevention or control of disease, or of any primary health essential and the activity relating simply to comfort, no physician would hesitate to turn over the latter to any other division of the public service.

Unfortunately, for the conservation and promotion of health in major

lines the public desires to see something concrete in return for the per capita mills. The health board, having within its purview collection of garbage or inspection of plumbing, does not dare to ignore these in the interest of efforts for a lowered infant mortality rate, or for the immunization of the community to malaria. What one writer calls the push of popularity is behind clean streets, but there is no insistence on that return which is not objective.

The present financial status of many health departments arises partially from this attitude of the public mind. Almost without exception appropriations are inadequate, thus precluding the possibility of doing the health work on a business basis. The successful director of any enterprise plans with a bank account adequate to do the work well. If remedial measures are imperative he does not hesitate to be destructive that he may be constructive. High-priced equipment for the planter is a paying investment. Both spend in the interest of economy. A survey of the water supplies of an entire state may seem an expensive health measure, but if by this means the typhoid fever death-rate can be lowered it is money well spent.

Information, exact and adequate, is one of the needs of an active health department, but the expense involved is not a popular bill, either with the public or the finance committee. This is logical because sums spent in the past for this purpose were out of proportion in comparison with the results.

There is still another phase of relative values in the expenditure of appropriations. The measures must justify themselves. The tax payer's money is a sacred trust; it is needed for many things fundamental in public welfare. This department, in common with all others, in the expenditures should consider conscientiously the certainty of results or the wisdom of experiments.

In the differentiation of values and activities the conclusions must depend on local conditions. But, I believe, for all boards of health there is one duty paramount—the instruction of the people in the phase of medical science, prevention, which promises so much for the well being of humanity.

Acceptance of these principles must necessarily be slow; it implies a change in attitude, in thought, in belief. Its constructive phase reaches into the roots of the social structure and into the habits and customs of the individuals. But it is only through conviction that permanent and enduring reforms can be wrought.

THE COUNTING OF BACTERIA ON SURFACES.

DR. ADOLPH GEHRMANN,
Chicago.

Read before the Laboratory Section, American Public Health Association, Colorado Springs,
September, 1913.

The numerous methods of floor and surface cleaning in use bring to us the necessity of selecting a technique for counting bacteria on surfaces that can give comparative results. Your attention is directed to these methods, and not to the results of counts. We have tried the different procedures in use and have found advantage in the method here described. There are some general facts relating to bacteria on surfaces that will also be of interest.

Bacteria on surfaces are in three different states: loose dust, smears, more or less water soluble, and held on oily surfaces. These conditions must be taken into account in making comparative counts before and after cleaning. We have found that the oil on surfaces acts as a protective covering for bacteria. In some street-car experiments the layer of dirt was so great that it could be lifted off in flakes. Attempts to disinfect such surfaces was not possible by spray methods. If such a surface is soaked up, it may yield many more bacteria from the deeper layers. The use of test bacterial suspensions in experiments on surface cleaning we found uncertain from a close numerical comparison, because the unit is not pliable as in the counts from liquids. A qualitative test may be like that from material from any other source.

We have used the following procedures:

Dust from a given surface by weight.

Water from washing a given area.

Swabs rubbed over an area.

Gelatin adhesive disc method.

Sealing off an area (as here described).

In using the dust method, there must be enough dust to be appreciable and in comparative tests the amount of moisture present is a variable factor. The wash water method is suitable for some direct examinations of surfaces. There is here, however, a very large factor in contamination during the swabbing up of the water. In using swabs a piece of paper with a hole was used to define the area, but we concluded that many bacteria were brushed aside. The gelatin adhesive disc method of Frost and Armstrong is suitable for accurate counting on surfaces. We found several reasons for adopting the method here described.

The area to be examined is positively set aside for our own use. It is perfectly protected from contamination. We can examine it quantitatively and qualitatively as fully as we may wish. Full control of the technique is certain, and possible growth of the bacteria during plating and the action of disinfectants is avoided.

My method for making these counts requires the following apparatus:

1. Cylinders of glass or other material, 3 to 4 cm. in diameter, with caps, and sterilized.
2. Test tubes containing 10 cc. sterile water.
3. Pipettes, 5 cc. capacity, and having .5 cc. special graduations.
4. Sterile Petri dishes.
5. Agar culture media.



Method of Sealing off Areas and the Special Pipette used in Plating.

6. Paraffin and brush.
7. Alcohol lamp.
8. Cup for melting tubes.
9. Forceps and grease pencils.

The technique of the method requires:

1. The wrapping and cover is taken from a cylinder and it is placed over the area to be tested.
2. Melted paraffin collodion, cement or glue is brushed around the cylinder, sealing it to the surface.
3. A tube of water is quickly poured into the cylinder.
4. With the 5 cc. pipette the water is agitated by drawing up and forcing down.

5. About 5 cc. of the water is withdrawn and emptied into the test tube, or .5 cc. is placed directly in a sterile Petri dish.

6. Plate cultures are prepared, following usual methods.

7. After cultivation the colonies are counted, and the bacteria calculated per square centimeter.

For making counts on perpendicular surfaces I have used a form of cover with a tube branch. This can be sealed to the surface in the same way as the cylinders for the horizontal surfaces. These covers must have a rim that is free so that the surface can be completely sealed. Their capacity should be such that the 10 cc. of water will fill the cover part completely to insure contact with the measured surface. The branch tube must be long enough to prevent any of the water splashing over the end. The general method is the same as that for making counts from horizontal surfaces.

The formula for determining the number of bacteria per square centimeter is as follows:

$$\frac{\text{Plate count} \times 2 \times 10}{\text{Sq. cm. in cylinder}} = \text{Bacteria sq. cm.}$$

Limitations in this procedure are that porous and irregular surfaces are not suitable for sealing; also it is only possible to make counts on walls up to within about two feet of ceilings.

In addition to the testing of surfaces in rooms and cars, we have found it of use in making counts from plates and other utensils in the household or in operating rooms.

The Columbus Laboratories.

BOOK REVIEWS.

Early Pulmonary Tuberculosis, Diagnosis, Prognosis and Treatment. By John B. Hawes, 2d, M. D., Wm. Wood & Co., New York, \$1.50.

In the publication of his small book on "Early Pulmonary Tuberculosis," Dr. John B. Hawes, 2d, of Boston, has filled a longfelt want. As Dr. Richard C. Cabot writes in the preface of this work—"There are plenty of large authoritative books about tuberculosis. There are plenty of small books which are not authoritative. Doctor Hawes has written a book which is small and yet authoritative."

In fifty-eight pages Doctor Hawes takes up the subject in a systematic concise manner, devoting a chapter each to the important facts of the family history, past history, work and habits, present illness, physical examination, diagnosis, prognosis, and treatment. There are also important chapters on "Adventitious Signs not Due to Pulmonary Disease"; on "Conditions which may Stimulate Tuberculosis"; and on special methods of diagnosis and treatment such as the X-ray, tuberculin, and artificial pneumo-

thorax. More might be added of the value of artificial pneumothorax in early cases which are characterized by hemoptysis or by high fever or by both. A novel feature of this book is the appendix, which fills forty-eight pages, and which, by means of illustrative cases, photographs and X-ray plates of identical cases, etc., brings out many of the important points discussed in the first part of the book.

If every physician would follow the advice given by Doctor Hawes, there would be many less cases of advanced pulmonary tuberculosis; this is particularly true in the case of children when the involvement of the bronchial glands should be recognized before the infection invades the lung tissue. Certainly there is no more important factor in the health of any community than the detection of early cases of pulmonary tuberculosis.

Rae W. Whidden, M.D.

Malaria: Etiology, Pathology, Diagnosis, Prophylaxis and Treatment. By Graham E. Henson, M. D., with an introduction by Charles C. Bass, M. D. Twenty-seven illustrations. 12 mo. 190 pages. St. Louis, C. V. Mosby Co., 1913. Price \$2.50.

The recent advances in our knowledge of the etiology of malaria and the application of this knowledge to its control and eradication are well reviewed and summarized by the author. The descriptions of the malarial parasites, their life cycles, and their mosquito hosts are detailed and clear. The discussion of the different factors in the epidemiology of the disease is complete. In a monograph of this character, there might be expected a fuller consideration of the pathology of the disease than has been given it. The discussion of the laboratory diagnosis of the disease is of great value. One wonders why the author fails to mention the impor-

tant work of Brown on the relationship between hematin and the malarial paroxysms, and in the discussion of the pernicious types of the disease no mention is made of malarial hemoglobinuria or blackwater fever. The chapter on prophylaxis is good, and in the chapter on treatment the use of the different forms of quinine is well considered. The reviewer believes that from the standpoint of a monograph, the value of the book would be enhanced if citations of the work of the authors referred to or quoted had been included. The mechanical features of the book are satisfactory.

Mark F. Boyd, M.D.

Hygiene and Sanitation: A Text-Book for Nurses. By George M. Price, M. D., Director Joint Board of Sanitary Control; Director of Investigation, New York State Factory Commission. 12 mo. 236 pages, cloth, \$1.50 net. Lea & Febiger, Philadelphia and New York, 1913.

This book forms one of a series of text-books for nurses and is devoted to the problems of general hygiene. The housing question is taken up with reference to ventilation, heating, disposal of wastes, and disinfection. In another chapter the hygiene of food is discussed. It includes the nutritive value of various foods, their preservation and particular dangers to health. Milk and its products are given a fairly complete account. One chapter is devoted to the

hygiene of the school, both as regards the room itself and the health of the pupils. The remainder of the book gives a brief discussion of the hygiene of occupation, municipal and personal hygiene. The author has succeeded in arranging his facts in a form which should make this book of very great value in the training of nurses, particularly along the lines of public health.

Ruth Bryant.

OTHER BOOKS RECEIVED.

Tuberculin in Diagnosis and Treatment. By Francis Marion Pottenger, A. M., M. D., LL. D., Medical Director of the Pottenger Sanatorium for Diseases of the Lungs and Throat, Moravia, Cal. 243 pp. Royal octavo. 35 illustrations, one colored plate. Price \$3.00. C. V. Mosby Co., St. Louis, Mo. 1913.

Underground Waters for Commercial Purposes. By Frank L. Rector, B. S., M. D., 12 mo v-97 pp. Illustrated. Cloth, \$1.00 net. John Wiley & Sons, Inc. New York; Chapman & Hall, Ltd., 1913.

Pocket Cyclopedia of Medicine and Surgery, Gould and Pyle. Second Edition, Revised, Enlarged and Edited by R. J. E. Scott, M. A., B. C. L., M. D. New York. \$1.00. P. Blakiston's Son & Co., Philadelphia, Pa. 1913.

London Public Health Administration. A Summary. By W. McC. Wanklyn, B. A. Cantab. M. R. C. S., L. R. C. P., D. P. H. Fellow of the Royal Society of Medicine, Fellow of the Society of Medical Officers of Health, etc. Longmans, Green and Co., 39 Paternoster Row, London, New York, Bombay and Calcutta. 1913. 59 pp. \$0.90 net.

Crime, Its Causes and Cures. By Thomas Speed Mosby, Member of the American Bar; Former Pardon Attorney of the State of Missouri; Member American Institute of Criminal Law and Criminology. Illustrated. 354 pp. \$2.00. C. V. Mosby Co., St. Louis. 1913.

HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS

Berkeley, California.

The report of the Commissioner of Health and Safety for the fiscal year ending June 30, 1912, includes the report of such health work as is carried on in Berkeley.

Berkeley, a city of only 43,000 inhabitants, spends only 12 cents per capita per year on health work. Vital statistics in general are almost wholly lacking. One hundred forty-four deaths out of 409 are unclassified and no division is made by ages or months. Total cases of infectious diseases and division of total deaths by ages are the only other statistics found. The police act as sanitary inspectors semi-annually and their reports are said to reveal the fact that from a sanitary standpoint conditions in Berkeley compare favorably with any city in California.

The report of the Milk Inspector and Veterinarian tells of work accomplished.

The best feature of the entire report is the part used by Dr. A. F. Gillihan, President of the Board of Health. He points out the fact that public health work in all its branches is shamefully neglected; that the appropriation for the work of the Health Department is hopelessly inadequate, and that it is only by virtue of the city's good fortune in having naturally healthful conditions and surroundings that the present low death-rate exists. Inspection of food supplies, medical inspection of schools, municipal laboratory, and "publicity and education" receive no attention whatever.

Malden, Massachusetts.

The Board of Health of Malden presents its report for the year ending December 31, 1912. Malden is a city of 45,000 (estimated) population and is a suburb of Boston. During 1912 there were 527 deaths making a rate of 11.72 per thousand (erroneously written 11.72 per cent. in the report), the lowest on record. Of the 527 deaths 104 were of children under one year of age. The number of births is not given. There are no nosological statistics of deaths except in the case of contagious diseases, but the deaths are classified by ages, months, and nativity.

The administration and appropriations seem to be divided between the Board of Health, the Health Department and the Joint Standing Committee on Health. The

necessity for, and duty of, these three branches is not made clear and they cause some confusion in the report if not in operation.

The work given in return for this money seems to be thoroughly and effectively carried on. Measles shows an abnormally high rate of incidence. Anti-mosquito measures were successfully introduced during the past year and will be continued. Improvements suggested for 1913 include a tuberculosis hospital, a refuse incinerator and other minor changes in the equipment of the division of refuse disposal.

The report indicates efficient work by the Board of Health but is in itself inadequate and incomplete.

Manchester, New Hampshire.

The Board of Health of Manchester presents its report for the year 1912. Manchester has a population of about 73,000 and is

largely a manufacturing city as a result of its favorable location on the Merrimack River. It has a large foreign population, the

majority of which is French. It will be seen that conditions are not naturally promising from the standpoint of public health, but among the members of the Board are a progressive physician and a commercial chemist who is an expert in public health work and very good results have been obtained in the face of some opposition.

The death-rate for 1912 is 15.02, and the mortality of infants under one year of age was 149 per thousand births. The total expenditure for all health work including isolation and smallpox hospitals was about 31 cents per capita per annum. The tabulated reports of the vital statistics are incomplete, an old alphabetical system of classification of deaths being used which has many defects.

New Castle, Pennsylvania.

The Board of Health of New Castle presents its first annual report, probably for the fiscal year ending June 30, 1912, although no definite statement of this can be found. The report is addressed to the citizens of New Castle and announces its object in the first paragraph as follows: "The Board of Health has prepared this pamphlet in order that the citizens of New Castle may become acquainted with the work that is being done and learn of the results that have been accomplished and of the ideals aimed at."

The remainder of the book of fifteen pages carries out this idea and is a bulletin of information rather than a concise report for

A considerable section of the report is devoted to a description of the various branches of health work carried on and a brief summary of the work accomplished in each and in some cases specimens of the forms used for reports to the Board.

The last eight pages of the report are devoted to the reports of the Milk Inspector, the Plumbing Inspector and the Sanitary Inspector. Of these the last two are routine statements of work done. The report of the Milk Inspector is complete and instructive. Medical inspection of schools is carried on by six part-time inspectors. All specimens for bacteriological examination are sent to the State Laboratory at Concord.

the year. Vital statistics are almost wholly neglected; the birth- and death-rates being omitted and no statement of total deaths or population (probably about 40,000) being given.

The city spends about \$6,000 a year for health work and most of the space is devoted to arguments proving that this investment has paid well and should be greatly increased. The arguments carry conviction and, from what can be learned, hard work has been done and excellent results accomplished. The Board is evidently alive to its deficiencies as well as to its duties and will make improvements as rapidly as possible.

Wheeling, West Virginia.

No one who sees the report of the Health Department for the two fiscal years ending June 30, 1913, can fail to be favorably impressed with it from the first. The report is attractively printed and is illustrated with five half-tone engravings, one large folded-in map showing the location of privy vaults in the city and two graphic charts of causes of death.

Wheeling is situated on the Ohio River and has a population of about 43,000. The death-rate for the year ending June 30, 1913, was 17.51, but exclusion of deaths of non-residents brings this down to 14.01. The birth-rate is 22.56 for the year ending December 31, 1912,

and the infant mortality rate is not stated nor obtainable from the figures, since births are given by calendar years and deaths under one year by the fiscal years. This emphasizes the necessity of making health reports by calendar years whenever it is possible. The expenditure during the fiscal year was 75 cents per capita of which amount 49 cents was used for garbage collection and disposal.

The city does not appear in a good light from the standpoint of communicable disease, perhaps chiefly because health work is rather an innovation and the physicians have not yet been educated to the point where they realize the necessity of reporting all cases immedi-

ately. This was particularly evident in respect to diphtheria and whooping-cough. Epidemics of diphtheria, measles and small-pox were vigorously fought by Dr. W. H. McLain, the Health Commissioner, who says in his report "At the risk of seeming peculiar, the writer admits that while all health department work is enjoyable, no part of the work is more interesting than 'stamping out' an epidemic." He numbers among his most effective weapons, vaccination against small-pox, diphtheria antitoxin for immunization, and isolation backed up by law. Of terminal disinfection he says—"The question of its efficiency or utility has been considered, but it should be continued if for no other reason than because it is easier to convince the householder of the necessity for a general cleansing of woodwork, floor, and furniture if fumigation is done by the health department."

The typhoid rate is abnormally high and Doctor McLain places the establishment of a modern filtration plant at the head of his list of recommendations for improvement.

Among other needs are the building of a new sewage system and the abolishment of all privy vaults, and the introduction of food and plumbing inspection.

The present officials of the Health Department are about to retire after seven years of what appears to be active and efficient service. The Health Department has been changed from the old fashioned passive organization to an up-to-date, constructive, and vigorous department. It admits the many defects which still exist but does not hesitate to point them out and tell how they should be remedied. Improvements made under the administration now retiring include municipal collection and disposal of garbage, the establishment of a tuberculosis sanatorium, improvement in the vital statistics by enforced registration of births and contagious diseases, establishment of a bacteriological laboratory, of medical inspection of schools, of milk inspection and examination with publication of bacterial counts, and of educational work. The city is unfortunate to lose a man who has been as valuable as Doctor McLain.

DEPARTMENT NOTES.

The Need for Health Education.

Those who do not come into direct contact with the poorly educated classes are unable to realize the depths of their ignorance or their need for the most elementary instruction in personal hygiene as well as in their share in community sanitation. It is probable that much of the educational work carried on by boards of health, valuable and necessary though it is, fails partially in its purpose by being over the heads of those who most need to improve. Some of the popular fallacies are detailed in the issue of the *New York City Weekly Health Bulletin* as follows:

"Among the many difficulties encountered by the Inspectors and Nurses of the Health Department when urging parents to have the various physical defects found in school children treated or corrected, the numerous traditions, prejudices and superstitions existing among the different elements which go to

make up the population of our cosmopolitan city stand out prominently.

"When the Inspector or Nurse suggests that an operation or other treatment be instituted some racial or religious prejudice or superstition will frequently be raised against such intervention. When glasses are suggested for defective vision, they are often told that eyeglasses are a luxury, that they make the child look old, that they are worn for style, that the child will get used to them, that they will become a habit, that they will cause the eyes to grow weaker or that they will interfere with the matrimonial chances of the daughter. When the parents are informed that the children do not hear well as a result, perhaps, of running ears, the Inspector is informed that this discharge allows the poison to escape and thus purifies the blood, and the statement is frequently made that at home the child hears too much. Difficulty of breathing due to enlarged

tonsils and adenoids results in the doctors and nurses being told by various elements of the population that God put the tonsils and adenoids there; that if the tonsils are removed, the throat will be too wide and air will rush into the lungs, subjecting the child to inflammation of the chest; that removal of the tonsils will interfere with the speech, the singing voice and the procreative power, or that the children will become nervous and depressed, possibly with suicidal tendencies.

"Voodooism is quite frequently met with amongst the negro population, and cases have been encountered where different colored yarns have been employed for the cure of contagious and other diseases of the skin and eyes.

"A request that hair matted by dirt and lice be cut frequently brings the retort that to cut the hair will prevent the growth of the child and diminish its strength. A request to have the defects of teeth remedied meets with the statement that pulling the teeth gives the children sore eyes; that it is bad luck for any poor child to have gold or silver in the mouth."

Vaccination Propaganda.

Discussing the physical vigor of school children and how to preserve it, Dr. S. Adolphus Knopf in the December 13 issue of the *New York Medical Journal* speaks of the necessity and effect of vaccination against smallpox as follows:—

"Vaccination against smallpox should be a requisite to admission to any school, public, parochial, or private, and periodical revaccination, particularly in times of epidemics, obligatory to continued attendance at school.

"Parents objecting to vaccination should be obliged to maintain their own schools. It would prove the best propaganda for compulsory vaccination. An additional and effective means to educate antivaccinationists and to convince them of their folly is to send them the authentic records wherein it is shown that in epidemics the nonvaccinated individuals have died and the vaccinated ones survived. A good authoritative statement to give to the antivaccinationists is the following: In Germany, where vaccination has been compulsory for many years, there has only been an average of fifty-three deaths annually from smallpox, while in Russia, where there exist

no compulsory vaccination law, for the same population there have been forty thousand deaths from smallpox annually. There is virtually not the slightest risk from a careful antiseptic vaccination against smallpox made with pure virus. Thus, for example, in the Philippines two million vaccinations were made without a single case of serious infection. But we need not go to the Philippines or foreign lands for a lesson. In a health bulletin, we read the following: 'Smallpox, in the first decade of which we possess records, killed sixty-six persons out of every 100,000 of the population of New York City. Until 1875, when 1,280 deaths were reported from this cause, practically no preventive measures had been undertaken by the authorities, but the high mortality of that year stirred the city officials to action and free vaccination by the Department of Health was then established and has been in constant operation ever since. In the decade 1874-1883, smallpox caused the deaths of 247 out of every 100,000 of the population. During the decade just elapsed, less than one person out of every 100,000 of the population died from this disease. Notwithstanding this eloquent lesson on the necessity of the thorough vaccination of communities, there still exist antivaccinationists who pass fiery resolutions in their society meetings and heap contumely upon the heads of officials who are charged with caring for the physical welfare of our citizens.' "

Restraining Unruly Patients.

Among the amendments to the New York State Public Health Law passed last spring none met with such severe criticism as that providing that

"Whenever a complaint shall be made* by a physician to a health officer that any person is afflicted with any infectious, contagious or communicable disease or is a carrier of typhoid fever, tuberculosis, diphtheria or other infectious disease and is unable or unwilling to conduct himself and to live in such a manner as not to expose members of his family or household or other persons with whom he may be associated to danger or infection, the health officer shall forthwith investigate the circumstances alleged. If he shall find that

any such person is a menace to others, he shall lodge a complaint against such persons with a magistrate, and on such complaint the said person shall be brought before such magistrate. The magistrate after due notice and a hearing, if satisfied that the complaint of the health officer is well founded and that the person is a source of danger to others, may commit him to a county hospital for tuberculosis or to any other hospital or institution established for the care of persons suffering from any such disease or maintaining a room, ward or wards for such person."

It was predicted that the section would be a dead letter from the beginning, that no health officer would avail himself of it, or any magistrate convict under it. That this is not the case is shown by the action of two health officers.

Dr. John S. Wilson, health officer of Poughkeepsie, N. Y., was the first officer to take action under the amendment. Some time ago a father and son were found to have tuberculosis and admission was secured for them in the Bowne Memorial Hospital. The apartments of the family were immediately renovated and disinfected, and arrangements were made for the mother and other five children in new quarters. The father did not care to remain under restraint at the hospital and returned home again and insisted on staying there. The physician in attendance was consulted and stated to the health officer that the patient was a source of danger to his family, and in accordance with the law the health officer had him taken before the city magistrate. After trial, in which the facts of the case were clearly presented, the judge committed him to the hospital as a careless and dangerous case. If this man still declines to remain at the hospital, further action will be taken against him.

The second example of the use of the amendment is a case of restraint of three unruly inmates of Iola Sanatorium in Monroe County who were formerly committed to the institution by a justice of the peace on the complaint of Dr. H. G. Shepard, the local health officer. Action was taken constraining them from leaving the sanatorium, as the testimony of the superintendent and house physician of Iola showed that they had left

the grounds of the institution repeatedly without permission and had conducted themselves in such a manner as to expose other persons in the institution and in the neighborhood to the danger of infection.

Sanitary Drinking Cup.

The Department of Health of Harrisburg, Pa., has approved of a paraffined paper drinking cup, which has a flap which can be inserted in a slot, and thus close the folded cup so that dust cannot get into it. The cup is then put in a small paper envelope and can be carried in the pocket. Thus the cup can be used several times before it wears out. On the outside of the envelope is printed, "Drink from your own cup and avoid contagion. This sanitary drinking cup can be used many times. Use it and assist the Department of Health, City of Harrisburg, Pa., to prevent diseases.

Dental Inspection of Schools.

After medical inspection of schools comes dental inspection. Properly it should come hand in hand with it and many will be surprised to learn how close is the inter-relation. The plan to be used in Detroit is described in the following article from the October number of the Bulletin of the Board of Health of that city.

"In the spring of 1912 the Board of Estimates and Common Council of the City of Detroit appropriated five thousand dollars for the inspection and care of the children's teeth in the public and parochial schools.

"Four dentists were appointed inspectors, who examined the mouths of fifty thousand children in ten months, ending June 20, 1913.

"The following five clinics were established; the Board of Health Building, Grace Hospital, Bishop School, St. Albertus Parochial School and the Newberry School. The four latter clinics were operated Saturday mornings only and the Board of Health clinic six mornings of the week. During ten months twelve thousand children were treated in these clinics.

"Saturday mornings the clinics were besieged by children, sometimes numbering as high as one hundred and fifty, where an operator could see only thirty in a morning.

On account of the great number applying for treatment very little permanent reparative work or prophylaxis could be done as it was necessary to relieve many a toothache by treatment or extraction.

"This year the Board of Estimates and Common Council allowed the sum of eight thousand dollars, which amount enabled the Board to establish a clinic in the Solvay Guild House, West Jefferson Avenue, and in the Neighborhood Settlement Association, Fourth and Porter Streets, as well as increasing the capacity of the other clinics 100 per cent., thereby making the Board of Health clinic six days a week.

"In this work the Superintendent of Schools and the Board of Education have coöperated to the fullest extent. Lectures are being given in the schools, forty-five schools being equipped with lanterns whereby lectures on oral hygiene can be given to the best advantage.

"The most gratifying part of this work is that the patrons of the clinics appreciate the service rendered. There are still thousands of children who need dental care but the clinics are unable to provide for them at this time."

Pre-natal Instruction for Mothers.

"Another link has been added to the chain of effort in the reduction of infant mortality by extending the activities of the milk stations to include the care of pregnant women. Thirty-six per cent. of infant mortality occurs in the first month, and it is safe to infer that the majority of these children die either because the mothers were physically unfit to bear healthy children or because of their ignorance of the proper care of their offspring during the first weeks of life. The milk station at 2287 First Avenue, Manhattan, has been selected as a center for the instruction of nurses in pre-natal work. When sufficiently familiar with its details, they will be assigned to other stations to carry it on. The nurses assigned to this work canvass the neighborhood and persuade expectant mothers to place themselves under medical care as early in pregnancy as possible; they communicate with the doctor of the hospital under whose care

the patient may be, and explain the desire of the Department of Health to coöperate and the manner and degree in which it is prepared to do so; they instruct mothers in detail with regard to diet, fresh air, food, exercise, clothing, etc., and impress upon them the importance of nursing their infants.

"In normal cases visits are made every ten days ante-partum and every three days post-partum; in abnormal cases, as often as may be necessary. Visits are made for one month after labor. The mothers are then requested to enroll their children at the milk station, where they are cared for during their first and second years.

"To date one hundred and seventy-five mothers have been enrolled, of whom twenty-five have given birth to children. While it is too early to show by figures what can be accomplished, it is most gratifying to note the appreciation of the mothers and the enthusiasm of the nurses."

Bulletin of the Health Department of New York City, November 22, 1913.

Trapping Animals Alive.

The *Canal Record* for November 26, 1913, tells of the granting of a patent to an inspector in the Colon Health Office for an animal trap of improved design which makes it possible to capture game alive and uninjured. The trap, when sprung, encloses the animal in a three-sided pyramid of wire netting but when set, lies flat on the ground and may be completely concealed by covering with loose light material. The *Record* speaks of its application as follows:—

"The inventor regards the trap as especially valuable in capturing rats alive. The fleas on rats, which constitute the rat-infecting agent in plague, and which are annoying even when not infected, leave the rat soon after it dies. If a rat is killed near another animal, or near a human being, the fleas will seek one or the other as a new host. Herein lies the advantage of capturing the rat alive, in order to destroy the fleas with it. The ordinary traps, it is claimed, often fail in their mission, as after a few captures the rats become unning enough to avoid them."

A Campaign Against Typhoid.

The Bulletin of the North Carolina State Board of Health for November, 1913, contains a short article telling how one city is starting out to reduce its contagious disease rate. We quote the article complete:—

"Several weeks ago the City of Charlotte elected Dr. R. F. Linebach, Assistant Superintendent of Health, and delegated to him the work of preventing disease. Doctor Linebach seems to have definite ideas as to his work; his campaign in attacking preventable diseases suggests the idea of selecting one specific thing and going after that, and then taking something else. We like this. There is entirely too much diffusion in planning health work, and we sometimes think the plans of health officers might be made a little less vague and a little more definite.

"Doctor Linebach has selected typhoid fever as the first disease with which he will deal; he has made an interesting study of the typhoid problem of Charlotte; his investigation has shown that 74 per cent. of the typhoid fever occurring in Charlotte occurs in families using wells, and 90 per cent. of the wells used by these families have been found polluted. His investigation has been in line with all other investigations in finding that the frequency of typhoid fever is greatest in those wards with open privies, and less in the wards that are thoroughly sewered. Based upon his investigation and findings, considerable pressure is being brought to bear on the city fathers to extend their water and sewer mains. Another important point still under consideration in the fight against typhoid in Charlotte is the proposition to close all polluted wells as soon as their pollution is shown by laboratory examination."

A Suggestion for Back Yards.

If the movement for cleaner back yards is not already under way in your city now is the time to launch it. If the people can be made to understand how the cleaning up of the yards may be directly profitable in cash as well as in the preservation of health they will be more enthusiastic. The following

suggestions are clipped from the *Bulletin of the Health Department of Asheville, N. C.*:—

"A report says that \$60,000 worth of vegetables were grown on the back yards of Minneapolis last summer. I am quite sure that a vegetable garden looks much better and is much better than weeds and tin cans and rags and papers and ash piles, to say nothing of this method of reducing the high cost of living.

"We are quite anxious that every person in Asheville should get interested in his back yard. The Woman's Civic Betterment League is intensely interested in the back yards of Asheville and have been making some pictures of the back yards of some of our leading citizens and it may be that some of these pictures will appear in the newspapers or in the moving picture show. This will not be a good advertisement for Asheville nor the particular citizen whose back yard the picture represents. It has been said that the proper cleanliness of the home and the people who live there is represented by the back yard, and not by the front yard. Suppose, Mr. Citizen, in the morning you go out and taken an inventory of yourself by looking over your back yard."

Getting the Public Interest.

The following article sent out by the Press Service of the *Chicago Department of Health* for publication in the papers of the city demonstrates one of the means the Department has taken to make itself more efficient:

"The Commissioner of Health has submitted to the City Council his estimate for the amount of money needed to carry on, in a fairly adequate way, the work of the Department in its various activities for the year 1914. Of course, as the responsible head of the Department, responsible to the people of this city for the manner in which he conducts the Department, for its value and efficiency to the Public, the Commissioner is urging the adoption of his estimates as presented. And because he believes that the people of Chicago are vitally interested in making it a safer place to live in from a health standpoint, he is asking their support and aid in securing an adequate appropri-

tion for health purposes. For the year 1913 the Council appropriated on a per capita basis, \$2.85 for police purposes, \$1.43 for fire protection and 30.8 cents for health protection. It is not asserted that the city is spending too much money per capita for police and fire protection, but that it is not spending enough for health protection.

"This year the Commissioner of Health is asking an increase of 16 cents or a total of 47 cents per capita for health purposes. In this connection attention is called to the fact that even with this asked-for increase allowed, Chicago will be spending less money for health conservation than New York, Philadelphia, Boston, Baltimore, Cleveland, Pittsburgh, San Francisco and many others of the smaller cities. A convincing fact as to the wisdom of increased appropriations is found in a study of the death-rates in the cities where increases of a substantial character have been made, is found in their materially diminishing death-rates.

"If you as a citizen are interested in bettering community conditions in Chicago, why not speak to your alderman about it? The men in the council are fair-minded, reasonable men; they are, naturally, interested in the matters which their constituents are interested in, and as a rule are both willing and anxious to carry out their wishes."

Department of Agriculture will use Bacterial Count in Milk Inspection.

Information has come to the Department of Agriculture that persons representing certain milk dealers are circulating the statement that the United States Department of Agriculture has abandoned all bacteriological examination of milk as a test for its cleanliness and fitness for human consumption.

The Department, therefore, has issued the following statement of its position.

1. All statements that the Department has abandoned, or will abandon the bacteriological examination of milk shipped in interstate commerce as a means of determining its cleanliness and fitness for human consumption are without foundation. While the Department has not fixed any specific

bacteriological count as a standard in the enforcement of the Food and Drugs Act, it does use bacteriological examinations in reaching its conclusions, and will continue to use these methods irrespective of what action any Association may take. The Department has never stated that it will not use such methods.

2. The only change in policy in the Department in regard to bacteriological examinations has been to discontinue basing prosecution upon the bacteriological examination of a single sample. It now collects a number of samples at different times and examines them bacteriologically. If the bacteriological examination shows that the milk is not clean, but is not a serious menace to health, and the bacteriological deviation from clean milk is a small one, the Department, through the Bureau of Animal Industry, endeavors to teach the dairyman how to produce clean milk. If he then neglects to take measures to make his milk clean and safe for human consumption the Department, by taking action in the case of milk shipped in interstate commerce, endeavors to force him to bring his milk to a point of safety and food excellence through prosecutions under the Food and Drugs Act.

The Death-Rate of Damascus.

"Not long ago the French government undertook the collection of vital statistics and general information as to the sanitary status of certain of the European and Asiatic provinces and for the purpose forwarded to the authorities of these provinces blank forms—questionnaires—accompanied by the usual polite note requesting that the data be supplied thereon and returned to the statistical bureau in Paris.

"The Pasha of Damascus promptly replied to the questions asked as follows:

"Q. What is the death-rate of your province?

"A. *It is the law of Allah that all should die—some die young, some die old.*

"Q. What is the annual number of births?

"A. *Allah alone can say. I do not know and hesitate to inquire.*

"Q. Are the supplies of water sufficient and of good quality?

"A. From the remotest period of time no one in Damascus has died of thirst.

"Q. Give general remarks as to character of local sanitation.

A. A man should not bother himself or his brother with questions that concern only Allah.

"EDITOR'S NOTE.—(a) All of which points to a rich field for sanitary missionaries. (b) Chicago knows little more about its births than does Damascus."

Bulletin of the Chicago School of Sanitary Instruction.

Prevalence of Venereal Diseases in Oskaloosa, Iowa.

"All the physicians of the city were asked to report to the health officer the number of cases of syphilis and gonorrhœa that they had treated during the year ending July 31. All reported. They reported a total of 62 cases of syphilis, 127 cases of gonorrhœa and 51 cases were not classified by those reporting. This is a total of 240 cases of venereal diseases occurring in a city of 9,466 inhabitants during the past year. It is interesting to compare their number with the combined total of all cases of typhoid fever, tuberculosis, diphtheria, scarlet fever, measles, german measles, smallpox, chicken-pox and whooping cough reported during the same period of time, which is 143."

From the annual report of the Health Officer, Dr. Mark F. Boyd, to the Board of Health of Oskaloosa, Iowa, for the year ending July 31, 1913.

No Friedmann Institute for Iowa.

Because of the efforts of the promoters of the so-called "Friedmann Treatment" to establish an institute at Colfax, one of Iowa's most famous summer resorts, the

State Board of Health of that state has adopted the following interesting rules:

SECTION 1. No hospital, sanatorium, institute or place for the care or treatment of persons afflicted with tuberculosis, syphilis, or any other infectious or contagious disease, shall be established, maintained or kept within the corporate limits of any city or town in the State of Iowa, or within three miles of such corporate limits, without first having all plans and methods to be used or followed, in conducting such hospital, sanatorium, institute, or place, and the location thereof submitted to and approved in writing, by the State Board of Health; and, if within the corporate limits of any city or town, such location must be approved by the local Board of Health.

SECT. 2. No business or profession, the carrying on or practice of which shall be calculated and designed to attract and shall tend to attract to any one locality, in unusual numbers, persons afflicted with tuberculosis, syphilis, or any other infectious or contagious disease, shall be carried on or practiced within the corporate limits of any city or town in the state of Iowa, unless the person, firm or corporation conducting such business or profession, shall have first provided a hospital or sanatorium adequate for the care, board and lodging of all persons coming to such city for such treatment, as provided in the preceding section.

These rules end the existence of the Friedmann institute in Iowa until it is established that the "cure" has proven reasonably successful.

Progress in North Carolina.

"There are eleven whole time County Health Officers in North Carolina. In this North Carolina leads every other state in the Union."

Bulletin of the Health Department, Asheville, N. C., October, 1913.

PUBLIC HEALTH NOTES.

Inadequate Mortality Statistics.

The following clipping from the October number of the *Medical Review of Reviews* takes up a subject which must be given serious consideration by both sanitarians and physicians. The article by Doctor Oertel is similar to one by the same author in the *Journal of the American Medical Association* for June 7, 1913, and is well worth reading.

"The importance of birth registration has been repeatedly placed before the medical profession. More essential for the elaboration of vital statistics is the accurate determination of the direct and indirect causes of mortality. In the May issue of the *American Underwriter*, Dr. Horst Oertel has called attention in a direct and straightforward way to the inaccuracy of American mortality statistics. In a brief but forceful arraignment of the unreliability of our present compilations as to the causes of death, he places a full measure of responsibility upon our present inadequate system of hospital administration, the ignorance, carelessness and haste of physicians in making out death certificates.

"While his plea for pathological diagnosis is at the present time impracticable of attainment, there is an excellent suggestion that 'every death certificate should show plainly whether a return of the cause of death is based upon clinical symptoms alone or additional objective microscopic evidence during the life of the individual or finally on the complete autopsy. These should be kept apart in three groups as unreliable, more likely reliable, and reliable death records.'

"The new courses in public health and preventive medicine should stress the importance of vital statistics, particularly that portion dealing with the causes of death. It is discreditable, though wholly understandable, that American statistics are at present so fraught with errors and inaccuracies that they are unsatisfactory for comparison with

elaborate foreign statistical reports dealing with mortuary facts. Increased facilities for making autopsies, raising the standards of medical education, and overcoming the popular prejudices, sentimental and otherwise, against autopsies, present the lines of attack whereby this odium may be relieved."

Camp Sanitation.

The *Engineering Record* for December 13 contains a note on camp sanitation which is interesting, inasmuch as it indicates the awakening of the engineers to their responsibility along sanitary lines. The State of Washington probably presents an especially good field for the beginning of the work of the Red Cross on account of the work which Doctor Kelly of the State Board of Health has already undertaken in the same line.

"At the recent Conservation Congress Miss Mabel Boardman, chairman of the executive committee of the American Red Cross, pointed out the work that lay before sanitarians in lumber camps. The work is by no means a small one. In the State of Washington alone no fewer than 47,000 men are employed in the lumber districts, while 800,000 is the estimate for the whole country. These men all live under comparatively primitive conditions, in more or less temporary camps, where sanitation, unless the management is progressive, is likely to be one of the last thoughts. She offered, on behalf of the Red Cross, to cooperate with lumber companies in supplying physicians who would give simple instruction, not only as to camp sanitation, but also as to first aid and the prevention of accidents. Attention is called to the matter here because good results would probably be obtained by investing the State Board of Health with supervisory and police powers. This has worked successfully in at least one state. The subject deserves the attention of sanitarians throughout the country."

Vital Statistics in the United States.

The following abstract is taken from the "Physicians Pocket Reference" of the Bureau of the Census and records the extension of vital statistics in this country and its present status:

"Beginning with the seventh census (1850) an effort was made to collect statistics of deaths through the enumerators of population as a part of the general census. This method was unsuccessful in giving reliable results—vital statistics can not be obtained by enumeration but only by immediate registration—but the plan was pursued at each subsequent census until the thirteenth (1910), when it was dispensed with entirely.

"In 1880 the results of registration of deaths under state and municipal authority were utilized, thus establishing the registration area. This consisted of only two states, Massachusetts and New Jersey, the District of Columbia, and certain registration cities in non-registration states. The aggregate population represented was 8,538,366, or 17.0 per cent. of the total population of continental United States.

"For 1900 there were added the states of Connecticut, Delaware (not entitled to admission and dropped at the next census), New Hampshire, New York, Rhode Island, and Vermont, which increased the percentage to 31.4.

"For the census year 1900 (ending May 31), there were added Maine and Michigan, raising the percentage to 37.9.

"The compilations theretofore made were only for census years, there being no data for the intercensal period. Beginning with the calendar year 1900, and since the establishment of the Bureau of the Census upon a permanent basis, there have been regular annual reports (Mortality Statistics, 1900 to 1911) and large additions to the registration area due to the constant efforts made by the bureau in coöperation with medical and sanitary organizations and with state authorities.

"Indiana was added for the calendar year 1900.

"California, Colorado, Maryland, Pennsylvania and South Dakota (dropped in 1910) were added for 1906; Washington and

Wisconsin were added for 1908; Ohio for 1909; Minnesota, Montana and Utah for 1910; and Kentucky and Missouri for 1911. The aggregate estimated population for the last year was 59,275,977, or 63.1 per cent. of the total estimated population of continental United States. The vast number of 839,284 deaths was returned for the latter year, so that although the United States does not possess a complete system of death registration, it does possess returns of great value from the twenty-two registration states, not including North Carolina from which returns are received from all municipalities of 1,000 population and over, under state law, District of Columbia, and 38 registration cities in non-registration states now constituting the registration area.

"The fundamental importance of accurate vital statistics for the protection of human health and life is universally recognized, and greater attention is being given to the subject throughout the country. Especially is there widespread interest in the South, which has heretofore been entirely unrepresented by reliable state registration—to its large sanitary and financial loss, because vague rumors of high mortality can only be confuted by accurate registration of deaths."

Facts About Collection of Garbage and Refuse.

"The average weight of garbage in cities is 1,150 to 1,475 pounds per cubic yard. The average weight of mixed rubbish and ashes is 800 to 1,100 pounds per cubic yard. In summer ashes form one third the mixture and in winter three fourths. The actual weights vary in different cities and in different districts in the same city, according to fuel used, whether rubbish is burned in stoves, habits and wealth of citizens, etc., so that a city must be divided into districts for collection purposes according to these variations as determined by a careful study.

"A garbage collector requires an average of three minutes to remove the garbage from a house, half this time being consumed in getting into and out of the houses, so that a back-gate collection will require much less time. He travels $2\frac{3}{4}$ to 3 miles an hour and visits 40 to 90 places in an eight-hour day.

"The garbage produced per capita averages from 175 to 225 pounds per annum, rubbish and ashes 325 to 530 pounds. Street sweepings amount to about $\frac{1}{3}$ cubic yard per capita.

"Mixed collection of all garbage and refuse costs less than separate collection. The mixture of all refuse is cleaner to handle, prevents fly breeding and lessens dust from ashes. The can for separate garbage collection is liable to become a greater nuisance than frequently collected garbage."

Municipal Engineering, October, 1913.

Dental Conditions and Cancer.

"In view of the movement to educate the public regarding the ravages of cancer and the importance of early detection of the disease, special interest attaches to a paper read before the recent International Congress of Medicine by Dr. F. St. J. Steadman, dental surgeon and lecturer on dental histology at the National Dental Hospital, which has now been reprinted in pamphlet form.

"Doctor Steadman developed the theory that a chronic septic condition of the mouth is by far the commonest predisposing cause of cancer. In the course of his practice he has found that most cases of cancer occur in those parts of the body most constantly infected by the constant swallowing of pus, that is to say the alimentary canal and its associated parts.

"All through my investigations, he says I have been extremely careful to exclude all possibility of the disease of the gums known as periodontal disease having developed after the cancer. The question arises how many years does it take for the inflammation of the bone of the jaw or teeth to advance sufficiently to allow the teeth to fall out? In other words, for how many years have these patients been swallowing pus? In my opinion, from fifteen to twenty-five years as a rule. Sometimes, however, the disease runs a fairly rapid daily course, in which case the teeth would be lost sooner than in fifteen years, and in some cases I have reason to believe it is so slow that it takes even more than twenty-five years."

Doctor Steadman summarises his conclusions as follows:

"1. That, apart from the sexual organs, over 86 per cent. of all cancer occurs in the alimentary tract.

"2. That long-standing chronic inflammation in the sexual organs and in other parts of the body is known to predispose to the development of cancer.

"3. That the great majority of persons suffering from cancer in the alimentary canal have advanced pyorrhoea alveolaris, which has been present very many years.

"4. That this advanced periodontal disease is not nearly so common in persons not suffering from cancer.

"5. That it is a well-known fact that the constant swallowing of pus can, and does, in many cases, bring about chronic gastritis.

"6. That the majority of patients suffering from cancer of the stomach have had chronic gastritis for many years prior to the development of the malignant disease.

The Medical Officer, November 22, 1913.

Heat and Infant Mortality.

An interesting article entitled "Heat and Infant Mortality" by Dr. J. W. Schereschewsky, Surgeon, U. S. Public Health Service, appeared in the December 5, 1913, issue of *Public Health Reports*. Doctor Schereschewsky, after considering the relations of the summer mortality of infants to the temperature curve, the character of deaths in the early and late summer, indoor temperatures, effects of humidity, circulation of air, housing conditions, and the effects of heat upon infants, draws up the following conclusions:—

"1. The action of heat as a direct cause in the summer mortality of infants has been greatly underestimated in the last twenty-five years. In the future much more weight should be given to its influence.

"2. The lethal action of heat is a function, not so much of the maximum and mean temperatures of the external air as of the indoor temperatures, which, in the late summer, may continue to be high, in spite of remissions in temperature of the external air.

"3. The action of dirty and stale milk in causing the death of infants has been given a significance which has overshadowed other factors of equal or greater importance.

"4. There is evidence to show that a certain proportion of infant deaths are due to specific infections, in the dissemination of which contact infection and flies doubtless play a part.

"5. As a result, future activities for the prevention of infant mortality must concentrate themselves to a great extent on the question of housing, especially the conditions productive of high indoor temperatures, such as overcrowding, narrow streets, and the absence of through ventilation.

"6. Poor housing conditions can be partially neutralized by the proper care of babies in the summer. The general public should be educated as to the importance of high indoor temperature in causing the death of infants, and especially as to measures which prevent babies from suffering from the heat.

"7. Breast feeding must still be regarded as a most, if not the most, important preventive of the summer death of infants."

Popular Health Education in England.

With customary thoroughness the English sanitarians have taken up the plan of educating the public in regard to health matters by posters and handbills. The following clipping tells of the campaign against tuberculosis:

"The publisher of *The Medical Officer*, 36-38, Whitefriars Street, E. C., on receipt of a postcard, is glad to send to tuberculosis officers and others interested, a complete specimen set of the various posters, handbills, etc., issued from this office in connection with the campaign against consumption. He has already supplied upwards of one million copies of these various designs to sanitary authorities in the United Kingdom, thus introducing pictorial methods of health teaching for the first time in this country. The large posters (60 x 40 inches) are suitable for display on hoardings, or mounted and varnished, with rollers top and bottom for hanging in schools, libraries, and as-

sembly rooms, hospitals, dispensaries, and other public places. Smaller posters (25 x 20 inches) are designed for use, mounted or unmounted, where space is limited. Handbills (12 x 9 inches) are available for house-to-house distribution, or printed on card for hanging in the homes of patients. These bills are also often used for teaching purposes in schools, a copy being given to each pupil, who probably takes it home and explains it in the family circle. All the publications described above have space left at top and foot for the insertion of local information, such as the addresses of tuberculosis dispensaries, provision of free sputum flasks, disinfectants, etc."

The Citizen and the Public Health.

Public Health Reports for November 7 contains an article on the above subject by Assistant Surgeon-General Trask which sums up the important topic of the individuals' relation to the health of the community in such a complete form that a considerable part is quoted here, with the hope that it may be quoted in part, if not wholly, by health department bulletins and daily papers, as well as professional journals, so that it may assist in the work of dissemination of knowledge of public health work.

"The health of the community is the combined health of those living in it. The relation of the citizen to the health of the community is therefore his relation to the health of his neighbors and of those living in the same city or state.

"The health of the community should be of interest to every individual, for upon it depends the welfare of himself, of his family, and of his fellow-citizens. Upon the health of the people depends the happiness and prosperity of the community. Without health there can be no real prosperity and such material success as may be attained is of little benefit.

"To the extent that the inhabitants of a community are sick the community itself is diseased. The community has health only in so far as the people are free from disease. To a community health is a valuable asset. It insures prosperity. It attracts people.

It increases the value of the land. Many letters are received daily at the Public Health Bureau at Washington from people who are contemplating buying land or moving from one state to another asking about the health conditions of certain localities. They want to know whether there is much sickness in this or that locality, whether there is any malaria, much typhoid fever or tuberculosis, and whether there is a pure water supply. People are thinking in these days of their physical welfare and have no desire to live in localities where insufficient attention is given to the prevention of disease and where there is more sickness than there should be. The community that has health has a distinct advantage in the competition for economic prosperity over the sick community.

"The health of the community depends upon the health of the citizens, but the health of each individual also depends in some measure, often in large measure, upon that of the other members of the community. Health of the individual is therefore a condition that, generally speaking, can be maintained only by a combination of individual and community effort, and its importance is such that in the activities of the city and of the state it should hold a prominent place. The health of the community should be of greater concern than commercial prosperity, for it is essential to commercial prosperity. Necessary as are our courts, our fire and police departments, and our educational systems, the importance of the community's attention to the citizen's health is second to none.

* * *

"The health department is the result of our knowledge that disease can be prevented and that the degree of the community's health depends upon the desire of the citizens to have health, their intelligence, and the amount of effort they are willing to make individually and through their municipal or their government to attain it.

"The work of the health department should mean more to the community than the perfunctory performance of certain duties. It should be a thing of vital interest

to every individual, and as such should receive his earnest coöperation.

"A part of the work of every health department is the enforcement of the laws and regulations which the people have had adopted for the protection of the community's health. Every intelligent citizen should know what these laws and regulations are. He should also compare them with the laws and regulations of other communities that he may know whether his city or state is doing as much as it should to protect a thing of so great importance to the individual and general welfare as the community's health.

"But of more importance than the enactment of laws or the promulgation of regulations is their enforcement. It is not the laws on the statute books that are of value, but the ones that are enforced.

"Every thoughtful citizen should know what work the health department is doing and the extent of protection from disease that is being given to him and to those dear to him. Such interest will in itself insure more efficient work, for the health department needs the interest of all intelligent citizens. It needs their moral support, their approval of work accomplished and at times their coöperation.

"Every household should see that it does not spread disease to others, that it does not become a focus of infection endangering the welfare of the community.

"Every citizen should keep his premises clean; should see that he is not maintaining collections of garbage or refuse in which flies may breed. He should see that all sanitary regulations are complied with and then should supplement these with as many more as his knowledge tells him will be useful. Whenever any member of his household contracts a communicable disease he should take such precautions as will prevent its being spread to others. He should bear in mind that every case of a communicable disease is contracted directly or indirectly from some infected person and that the case in his family is probably due to some one's neglect of his responsibilities to the community. His household should not become the cause of the further spread of the disease. If the disease

is one that should be reported to the health department he should see that this is done, and in any case if in doubt he should communicate with the health department for advice or instructions, for the health department is maintained by him and his fellow-citizens for this purpose."

Radium Treatment of Cancer.

The American Society for the Control of Cancer fears that exaggerated ideas of the power of radium in the treatment of cancer may result from the recent publicity given to this agent in the daily press. It appears highly important at the present time that the limitations of radium in the control of cancer should be emphasized as well as its favorable effects in certain cases. Otherwise the familiar story of new hopes, destined only to disappointment, will again be recorded at the expense of many unfortunate sufferers.

The curative effects of radium are practically limited today to superficial cancers of the skin, to superficial growths of mucous membrane which are not true cancers, and to some deeper lying tumors of bone, etc., which are not very malignant. The problem of the constitutional treatment of advanced, inoperable cancer is still untouched by any method yet devised or likely to be devised for administering radium. Even among the so-called radium cures, it still remains to be determined in many cases whether the favorable result is permanent or is to be followed sooner or later by the usual recurrence. The most competent surgeons do not dare to pronounce a case cured until five years have elapsed after an apparently successful operation. The same test must be applied before we can finally determine the real value of radium.

It should be emphasized especially that radium cannot at present exert any permanent benefit on generalized cancer, and since cancer, in a very large proportion of cases, is widely disseminated in the body early in the course of the disease, this entire group of cases can expect no important relief from radium. Another large group of cancers is comparatively inaccessible to the application of radium, so that the ulti-

mate course of the disease is not effected, although certain portions of the tumor may be reduced in size. Again, many forms of cancer, although localized and accessible to radium, grow very rapidly and resist the curative action of this agent, so that no real benefit can be expected from its use.

The best results of radium therapy can be secured only when comparatively large amounts are available for use and the present limited world's supply of this metal places it out of reach of the great majority of patients. It is to be feared that much harm may result from undue reliance upon small quantities of low grade radium when other methods of treatment would be more effective.

Evidence of the possible extent of popular misconception on this subject is found in a pathetic letter recently received at the New York Health Department from a sufferer in California who had somehow obtained the impression that the United States government was about to purchase large quantities of radium from abroad. Assuming that the "New York City physician" would have a plentiful supply, the writer asked that some be sent to him C. O. D. without delaying to advise him as to the cost.

Under the term "cancer" are commonly grouped several diseases which differ widely in nature, causation, and courses, and in their response to radium. It requires both skill and experience to determine just what type of cancer one has to deal with as well as the advisability of using radium. Hence, it is extremely difficult to formulate an accurate statement of the true position of radium therapy, but it is quite clear that the exploitation of this remedy as a cure of cancer in general is to be deprecated.

The Action of Bile upon the Bacillus Coli.

"In *The Journal of Infectious Diseases* for May, E. O. Jordan gives the record of a series of experiments designed to determine to what degree the multiplication of the bacilli coli takes place in bile. With a view to ascertaining the degree of inhibition, a number of pure cultures of various ages and histories were placed in suitable suspension

and in parallel series upon plain agar and bile-agar.

"He ascertained that freshly isolated strains of this organism as well as those under long cultivation were inhibited by the bile to a noteworthy degree. This growth seems to take place with little regard to the vigor, or lack of it, of these bacilli. The observation showed that bile inhibits at least from one-third to one-half of the vital cells of the bacillus coli, and sometimes a much greater proportion; that freshly isolated cultures are inhibited in the same degree as those under long cultivation and those subject to long sojourn in water; that there is no evidence that bacilli coli that were unable to grow on the bile medium were any more attenuated or less vigorous biologically than their fellows.

"Jordan holds these facts to demonstrate that bile is an inhibiting substance for the bacillus coli as for other microorganisms, and that its presence involves the suppression of a certain number of viable cells."

The American Journal of Clinical Medicine, December, 1913.

How Red Cross Seals Have Helped.

Although it is too early in the year to tell what the financial results of the 1913 Red Cross Seal sale have been, evidence is already at hand that in several states the anti-tuberculosis campaign has taken on a new lease of life or been greatly stimulated because of the campaign.

South Carolina is one illustration. Here it has been extremely difficult to effect any state-wide effort and what local movements were carried on were not very far-reaching. Through the National Association's field agent, Dixon Van Blarcom, a state Red Cross Seal Commission was organized and a campaign of education, money-raising, and coöperative work has been carried on in over 150 towns and cities. The already awakening forces of Columbia were further stimulated and now a visiting nurse is at work in that city and a regular tuberculosis clinic under the direction of Miss Bessie Ray of the Associated Charities, has been established. Other cities have also awakened

and with small funds are planning for local work. The State Commission will also have a small balance in the treasury as a nucleus of a fund for the State Association.

South Dakota is another state where Red Cross Seals have opened up a new work. Here, Mrs. E. P. Wanzer of Armour was interested by the National Association in the seal sale. They organized a State Commission and carried on a vigorous sale—over 100 cities and towns. While the aggregate sale will not be large compared with that of eastern states, it represents a fine beginning of anti-tuberculosis work in a state where nothing before had ever been done. Hundreds of men and women and children have been interested permanently through the Red Cross Seal Campaign—The Anti-Tuberculosis Crusade.

Oklahoma too has shown signs of a new life as a direct result of the Red Cross Seal. The moribund state organization has been rejuvenated and put on a basis which bids fair for future work. Interest has been stimulated throughout the state. The campaign has had the backing and financial support of the State Board of Health and its officers.

What has been done in these three states has been duplicated or surpassed in such states as North Carolina, Arkansas, West Virginia, Missouri, to say nothing of the long list of states which, for the same thing, have been active—Anti-Tuberculosis work.

X-Ray Examination of Pre-Tubercular Children.

The *Medical Officer* of November 6, 1913, contains a note on an investigation of a method for the early diagnosis of tuberculosis which seems very promising and worthy of further study. We quote the article complete:

"The results of a series of examinations in the schools of the chests of delicate children by X-rays, made by Dr. A. G. L. Reade, have been reported to the London county council. On examining some children by the ordinary physical methods it may be found that they are the subjects of early pulmonary

tuberculosis, but in the vast majority of cases no physical signs are observed. In some cases, it is reported, the X-rays revealed evidence of definite tubercular disease, but in the vast majority of cases the examination showed shadows cast by enlargement of glands. The glands may be primarily tubercular, or the enlargement may be due to lesions in the lungs so small that they escape detection during life. It seems certain that the X-ray appearances described are produced by disease in the region of the bronchial glands, and it is reasonable to suppose that the shadows are due to tubercular lesions. It is, adds the report, evident that the recognition of these X-ray appearances as pathological and not physiological is of the utmost importance. If the shadows are found when there are no physical signs in the lungs, the case is in an early stage, when treatment may reasonably be expected to be more beneficial than if left till the disease is further advanced and has caused such pulmonary involvement as to be recognized by physical signs in the chest."

Immunization to Typhoid and Tuberculosis.

The recent discrediting of the Friedmann cure has left the public mind in a condition unfavorable to the reception of any new cures which are not thoroughly tested and proved. Notwithstanding this fact the *New York Medical Journal* of October 11, 1913, gives space to a preliminary report on a system planned to produce immunity to typhoid or tuberculosis by the mere drinking of the milk of immunized animals. The report is brief and tells little of the details of the method or of any confirmatory experiments, but even before the completion of the projected demonstrations the author feels justified in publishing the following conclusions:—

"1. Cows and goats can be immunized against tuberculosis and typhoid fever without any ill effects.

"2. During and after immunization the milk remains wholesome, differing in no

respect from other milk. My family and myself have taken for months milk immunized against typhoid and tuberculosis.

"3. The milk of immunized animals contains antitoxines and bactericidal substances, differing in no respect from those of blood serum.

"4. The usual laboratory tests demonstrate the presence of agglutinins, precipitins, and bacteriolysins.

"5. Immunized milk is inimical and destructive to the microorganisms against which the animal is inoculated.

"6. Immunized milk lessens the liability of infection, owing to its bactericidal properties and productive passive immunity.

"7. It is useful and indicated in cases where passive immunity is desired, and subcutaneous injections are impractical and contraindicated.

"8. Passive immunity and protection against infection is obtained by drinking the milk of immunized animals. The drinking of six ounces for five alternate days produces protection against typhoid and tuberculosis infection. The milk must be taken on an empty stomach.

"9. The fact that immunized milk destroys the tubercle and typhoid bacilli and produces antibodies in the blood, clearly shows its indication and usefulness in cases of typhoid fever and tuberculosis. It should be used in every suspicious case, as it may absorb an infection in its incipency."

Bacterial Sprays in Diphtheria Carriers.

"From time to time numerous investigators have advocated the use of bacterial sprays, usually fluid cultures of the staphylococcus aureus or the lactic acid bacilli, for 'freeing' the throat secretions of diphtheria carriers from the Klebs Löffler bacilli. This procedure defeats the practical value in employing culture methods for the release of quarantine. Frequently, where cultures are submitted for diagnosis, the normal throat organisms will outgrow the Klebs Löffler bacilli and give negative results. Although these instances are the exception, it can be more readily obtained by the introduction of pure bacterial sprays of other organisms. During

convalescence, where the diphtheria bacillus is present in comparatively small numbers, and usually confined to the deeper follicles of the tonsillar structure, cultures made in the usual manner will fail to reveal any other organism than that in the bacterial spray.

"The laboratory of the Department has made a very careful investigation and finds that the introduction of bacterial sprays do not destroy the Klebs Löffler bacilli in throat secretions. On account of the predominance of the organism introduced in the spray, oftentimes the cultures do not reveal the growth of the Klebs Löffler bacilli, but this bacillus still remain present in the source from which the culture was made and by a cessation of spraying will permit it to reappear in cultures.

"For these reasons the use of bacterial sprays for the obtaining 'diphtheria free cultures' furnishes false security, and defeats the efficacy of the culture method for determining the time for the release of quarantine. Diphtheria free cultures can be obtained by the introduction of the bacterial spray, but the diphtheria organisms may still exist and are in no way influenced by the presence of the bacteria in the spray. Persons released from quarantine by such cultural evidences may still remain a 'carrier source' in the transmission of diphtheria."

Buffalo Sanitary Bulletin, September 30, 1913.

Seven Hundred Thousand School Children of New York to Help the Health Department Keep the City Clean.

"In the public schools the children can learn to help the health department keep the streets, playgrounds and the gutters free from rubbish; the alleyways clean—where filth and disease lurk.

"To prevent insanitary conditions about milk stations, the open disregard of uncovered and overloaded garbage cans, the dangerous obstruction of fire-escapes, the sale of poisonous candy and ice-cream.

"To assist the police maintain orderly conduct on the streets and playgrounds.

"The children of every public school can be organized into small civic classes or clubs, each devoted to the care of some particular need of the city—keeping fire escapes clear of obstructions. The children's reports on the conditions of the localities where they live can be brought to the classroom for discussion and whatever is urgent submitted to the proper city authorities.

"Such practical work gives the children an understanding of the city's needs, and from the earliest years the public schools can teach their children how the city is governed and make them familiar with its buildings, institutions and industries"

Bureau of Municipal Research, New York, November 26, 1913.

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METHOD OF COLLECTION AND VALUE OF MORBIDITY STATISTICS.

JOHN W. TRASK,

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D. C.*

Read before the Joint Session of the Sections of Public Health Officials and Vital Statistics, American
Public Health Association, Colorado Springs, September, 1913.

Morbidity statistics are the statistics of disease. They are classified facts regarding the incidence and relative prevalence of disease and sickness as shown by the occurrence of cases. Without morbidity statistics in some form, we cannot know of the occurrence of disease or its relative prevalence, present or past, knowledge upon which the control of disease must in large measure be based.

There is confusion in the minds of many as to the relationship of morbidity and mortality statistics. Their relationship will be readily understood when it is considered that morbidity statistics are classified facts regarding the occurrence of diseases and include all cases, while mortality statistics are classified facts regarding the occurrence of those cases only which end in death. In the absence of morbidity statistics, mortality statistics have been used by public health workers as a gauge by which the relative prevalence of disease might be estimated, for it is in the prevalence of disease that the sanitarian is fundamentally interested, rather than in the number of deaths. While mortality statistics have been exceedingly useful for this purpose and have supplied a working basis which would otherwise have been lacking, used in this way they are at best a substitute to be employed only in the absence of something better. The use of mortality records as an index of the prevalence of a disease is based on the assumption of a fixed fatality rate for the disease under consideration. But in comparatively few diseases are the fatality rates fixed. It is especially true

in the infectious diseases that the fatality rates may vary greatly in different outbreaks and under varying circumstances. Also a high sickness rate is occasionally found associated with a moderate mortality rate. Then, too, there are diseases of which a knowledge is required in public health administration which do not perceptibly affect the mortality rate and seldom appear in mortality records.

In comparing thus the relative uses of mortality and morbidity records in showing the prevalence of disease, it must not be construed that there is any intention to minimize the importance of, or necessity for, complete and accurate mortality records. Mortality records serve many other purposes, and are a fundamental necessity to every community.

In the development and social evolution of a community or nation, the various needs for the accurate recording of deaths have usually been felt first. Then with the inception of public health work has come increased attention to the causes of deaths and the conditions under which they occur. An appreciation of the necessity for morbidity records is a later development, and comes to a community or nation only with the beginning of earnest and well considered sanitary administration. Morbidity records are necessary when a knowledge of the prevalence of disease and the conditions of its occurrence are desired.

Morbidity statistics, the compiled and classified facts regarding the occurrence of sickness, show the varying prevalence of disease during previous months or years and are, therefore, of value in studying the conditions and causes that have contributed in producing disease. While their value for this purpose is great and will be underestimated by few, one of the main functions of morbidity statistics is the current information given during the collection of the data of which they are composed. The control of a disease must in most instances be intimately associated with a knowledge of the occurrence of cases, and this knowledge is obtained in the primary collection of the data from which morbidity statistics are derived, that is, the notification of cases. The health officer, who knows only of the fatal cases of a preventable disease, is to a certain degree merely a recorder of past events. If it were possible for him to know of every case, preventive measures could be inaugurated at a comparatively early stage, the source of incipient outbreaks could be found, and the occurrence of additional cases prevented.

Reports of cases of disease serve primarily four purposes which may be stated as follows:

First, to show the occurrence of cases of communicable diseases which constitute foci from which the infection may spread to others—as in scarlet fever, typhoid fever, tuberculosis and smallpox.

Second, to show the occurrence, distribution and varying prevalence of certain maladies of which the cause or means of spread is unknown, in

which they furnish information of possible value in ascertaining the cause or means of spread—as in pellagra.

Third, to make proper treatment possible, as in ophthalmia neonatorum, diphtheria and tuberculosis.

Fourth, to show the existence and location of conditions that are capable of causing illness or injury as in the industrial diseases and intoxications.

Fifth, to show the need of certain sanitary measures or works and to control and check the efficiency of such measures or works when put into operation. In pulmonary tuberculosis such reports show the number of consumptives in the community and the need for sanatoria. In malaria they show the prevalence of disease, the need for drainage and other anti-mosquito works, the efficiency of such works when in operation, and when a change in the prophylactic measures or additional ones are necessary. In typhoid fever they show faults in the water supply or in the control of the production and distribution of milk or in the disposal of excreta in special localities.

Sixth, morbidity reports when recorded over a period of time and properly compiled become a record of the past occurrence of disease. They show the relative prevalence of disease from year to year and under varying conditions. They show the effect of the introduction of public-health measures and of sanitary works. They give a history of disease not obtainable in their absence.

In the United States, most sanitary matters are controlled by the several states, and the power to legislate regarding them resides in the respective state authorities. In certain of the states the requirements regarding morbidity reports have been enacted into law, in others, authority has been given to the state boards of health to cover the subject by regulation. In some states, the control of morbidity reports as well as certain other sanitary matters has been delegated in whole or in part to certain of the local authorities. In most instances, local authorities have the right to supplement the state requirements by such additional ones as may be indicated. In a number of states, certain cities, usually the larger ones, are exempted in whole or in part from the requirements regarding the reporting of the occurrence of disease which apply to other parts of the state. This exemption of cities is patently illogical and is based on a misconception of the reciprocal responsibilities of state and local sanitary authorities.

Under existing conditions, the laws and regulations of the several states, in regard to morbidity reports, differ widely as do also the attempts being made to enforce these requirements. As disease is no respecter of political divisions or state boundaries, and as the welfare of every state is intimately related to the morbidity conditions in other states, there is a need for the enactment and enforcement of uniform minimum requirements for the reporting of the occurrence of preventable diseases.

In the collection of morbidity reports, the most common plan in operation in this country is to require physicians to report to the local health department the occurrence of cases of certain diseases seen by them, these reports to be made usually immediately or within a definite time after the diagnosis has been made. The local health officers in some states forward at once these reports, or merely statements of the number of cases notified, to the state department of health. In some states, the local officers report to the state authorities weekly, in others monthly. In one state, the reports are made twice a month, and, in a few states, at intervals of more than a month. In those states where the local authorities report the notified cases to the state department immediately or daily, the state health department is in a position to keep currently informed regarding the prevalence of the notifiable diseases throughout the state. This is in less measure true in those states in which the reports are forwarded weekly by the local authorities. Where the reports are made at longer intervals, they cease to be strictly of current value to the state health department. They have lost their public health value for current use, and remain useful only for purposes of morbidity statistics.

It is difficult to conceive of an efficient or seriously administered state department of health which does not know and makes little, if any, attempt to learn of the current incidence and relative prevalence of preventable diseases throughout its jurisdiction.

In this connection, a matter worthy of consideration is the relative importance of the enactment of laws and their enforcement. Laws do not enforce themselves, and it is a debatable question as to whether an unenforced law is not worse in its ultimate effect than the absence of law. The statutes of many states are filled with public health laws, and chief among them perhaps are the requirements in regard to the notification of disease, which are not enforced and for which in some cases there is little provision for enforcement.

Another factor which enters into the securing of morbidity reports by state health departments is in many instances the absence of control by the state health department over local health officers. For a state to have an efficient system of morbidity reports, the state health department needs to have some means of insuring that local authorities will forward regularly the notifications of disease made to them. Without such authority morbidity reports for a state as a whole must necessarily be impossible unless the state authorities supplant the local health officers in the collection of morbidity reports in local jurisdictions. Where local authorities have control of sanitary administration within their respective jurisdictions and are responsible only to their respective communities, the state health department is practically without jurisdiction, and its usefulness is unduly limited. This control of local health officers by the state board or depart-

ment of health has been found essential, especially in the securing of morbidity reports for a state, and in a considerable number of states control in one manner or other over the local authorities has been given to the state department of health. In some, this control is secured by the state board of health appointing all or a majority of the members of local boards of health, in others, by giving to the state board authority to remove from office local health officers.

There are forty-eight different diseases which have been designated by law or regulation as notifiable in one or more states. These do not include the occupational diseases, for the notification of which there have been a number of laws recently enacted, or mental deficiency, which is notifiable in one state. The diseases which have been most commonly made notifiable are cerebro spinal meningitis, diphtheria, leprosy, measles, plague, poliomyelitis, scarlet fever, cholera, smallpox, tuberculosis, typhoid fever, typhus fever, whooping-cough, and yellow fever. These are each notifiable in twenty or more states. Smallpox is designated as notifiable in forty-four states, diphtheria in forty states, and scarlet fever in thirty-nine. Cancer is notifiable in New York State, and chagres fever in Alabama. Venereal diseases are notifiable in California, Utah, and Vermont. The manner of notification, however, differs from that for other diseases, in that in the reporting of venereal diseases the name of the patient is not given. Cases of mental deficiency, including epilepsy, are notifiable in New Jersey. Amebic dysentery and paratyphoid fever are notifiable in the state of Washington and the territory of Hawaii; barber's itch in Oregon; favus, echinococcus disease and paragonimiasis (lung fluke disease) are notifiable in the state of Washington, and follicular conjunctivitis in Hawaii. Fifteen states have enacted laws requiring the notification by physicians of certain occupational diseases. The diseases commonly included in these laws are compressed air illness and poisoning by lead, phosphorus, arsenic or mercury, or any of their compounds. Anthrax is also included in a number of the laws and wood alcohol and brass poisoning in others.

In the notification of diseases, it has usually been customary to require the physician, in making his report, to include all the data regarding the case desired by the health department. In the majority of instances, no further data regarding these cases are secured by the health officials. While it may be impracticable in most instances to change this practice at the present time, it must be recognized that a local health department should prefer to collect the data regarding each case itself, and should not be willing to depend upon the physician's report for its epidemiologic information. Logically, the only information which the physician should be depended upon to give in his report is the occurrence of a case, or a suspected case, of a given disease in such and such a person at such and such an address.

He might properly be required to add to this such data as are a matter of record, or easily verified, such as the age, color, and sex of the patient, and similar information. The local health department, however, should be reluctant to depend upon the diagnosis of the practising physician, unless such diagnosis has been verified by a trained diagnostician in the service of the department itself. Verification of the diagnosis by the health department has been the practice during recent outbreaks of such diseases as yellow fever and plague. It is also the practice in certain other instances. It must necessarily become the practice whenever a determined effort is to be made in the control of any preventable disease.

Since each state has exclusive authority within its jurisdiction over the requirements for morbidity reports, any comprehensive plan that may be developed for morbidity reports and morbidity statistics must be the result of combined effort and coöperation, and the enactment by the several states of similar requirements. It implies also an adequate enforcement of these requirements. The question of state morbidity reports is one of the most difficult problems to be solved by the state authorities. A number of states have been endeavoring earnestly to solve the problem within their respective jurisdictions. Considerable progress has been made in several instances. The question is one which is bound to be an important one, and to receive much consideration during the next decade. The state health authorities in conference with the Public Health Service have had the matter under consideration in connection with their annual conference, and have approved a model state law for morbidity reports.

In a previous conference, the state health authorities had taken action whereby regular reports of the prevalence of disease in their respective jurisdictions were to be forwarded to the surgeon-general of the Public Health Service, these reports to be made at intervals by mail, and, in the case of certain diseases or outbreaks, also by telegraph. These reports are published by the surgeon-general in the *Public Health Reports* which are issued weekly in editions of between eight and nine thousand copies, and are sent to state and local health officers and to those engaged in sanitary work. At the present time, however, the health authorities in many of the states are unable to forward these reports as the data are not available in their respective offices. With time and increased appropriations the states that are not now in a position to report will become able to do so, and the states that are now reporting will be able to improve their reports and make them more complete.

NEWER ASPECTS OF PUBLIC HEALTH EDUCATION.

DR. HOYT E. DEARHOLT,

Milwaukee, Wis.

Read before the Sociological Section, American Public Health Association, Colorado Springs,
September, 1913.

The establishment of a bureau of health instruction in the Extension Division of the University of Wisconsin is based upon the faith, which no longer needs exposition nor defense, that ignorance and apathy are the basic and underlying factors in the spread of preventable disease. To us in Wisconsin, who know and understand the State University and the spirit which animates it and gives it character and personality, the establishment of such a bureau does not seem nearly so strange as that so logical and entirely practicable a department of instruction should not have been instituted before.

You must know that the distinguishing characteristic of our State University is "service"—service no less to the citizenry which generously taxes itself for its support than to the relatively small group of youthful citizens (about 5,000) whom favorable circumstances permit resident instruction. This service is not offered nor given ostentatiously as is imagined by some after reading criticisms directed against the administration and, even more, after reading the fulsome praise and extravagant statements of an occasional special feature writer in a popular magazine.

This explanation seems necessary in order that I shall not extend the fallacious notion, which exists occasionally outside of Wisconsin, and here and there even in our own state, that the University is on the one hand merely a popular, more or less socialistic information dispensary or on the other hand an autocratic, meddlesome "Brain Trust." Permit me the statement that exact knowledge is nowhere held in greater veneration, nor more devotedly sought, than in the academic circles of the University of Wisconsin. But the conception of a great educational institution, owned and controlled by the people, does not permit of any notion that the University shall be merely a museum for the safe storage of valuable knowledge. Knowledge loses none of its dignity and no veneration in Wisconsin when it is put at serviceable work, however humble that service may be.

It is this conception which led, six years ago, to the establishment of the Extension Division as it is now organized and conducted. Previous to that time, there had been the same sort of University Extension Lectures which are still to be found amongst the enterprises of other universities, a sort of fungus growth which added little of value to the parent stem which

gave it seat, or to the wealth in genuine knowledge and culture of the public which supported and patronized it.

With the ideal of taking the advantages and opportunities of the University to the people who could not come to *it*, the fact was appreciated that a new system of instruction must be evolved: a system, which, while having its foundation in the university structure, should still be fashioned to meet the needs of the student, who, while possibly deficient in preliminary education, nevertheless has sufficient mental capacity to grasp basic truths when presented in a form adapted to his educational limitations. In other words, it was found to be practical to adapt the system of instruction to the pupil rather than to attempt the frequently impossible, or at least impracticable object, of adapting the student to the system of instruction. Under this conception, an organization was effected which embraces four main departments:

Correspondence Study.

Instruction by Lectures.

Debating and Public Discussion.

General Information and Welfare.

CORRESPONDENCE STUDY.

It has been found that where knowledge and not credit is the object of the student, correspondence study in many instances offers opportunities to the mature, ambitious student, which are more eagerly sought and finally more exhaustively utilized than are the previously more venerated lectures, demonstrations and quizzes of the resident student who frequently arrives at the University little more than an overgrown boy.

Teachers, who before engaging in correspondence instruction were exceedingly skeptical concerning it, have, with actual experience in the work, grown so enthusiastic over the results, that they have chosen to devote their energies exclusively to correspondence rather than to resident instruction.

As indicating the diversity of the instruction that is successfully carried on by this means, the following list of subjects is most interesting and suggestive:

Geology and Mineralogy,	Astronomy,	German,
Hebrew,	Bacteriology and Hygiene,	Greek,
History,	Botany,	Home Economics,
Latin,	Business,	Italian,
Mathematics,	Chemistry,	Mechanical Draw.,
Music,	Education,	Pharmacy,
Philosophy,	Electrical Engineering,	Physics,
Political Economy,	English,	Spanish,
Political Science,	French,	Surveying.
Structural Engineering,	Gardening,	

INSTRUCTION BY LECTURES.

An attempt is being made in this department to furnish popular lecture courses and entertainments which, in attractiveness, business-like booking, routing, press agenting, advertising, etc., will vie with the best of the commercial lyceum and lecture bureau services. In addition to this, it is the aim, of course, as a university enterprise, to patronize and offer only those feature attractions which are above reproach. In short, a demonstration is being given that learning and culture are not always dull and uninteresting, nor necessarily a form of self-immolation.

In a given community, the public is given what it believes it desires, even though this fall below the standard the department holds. Experience has bred the assurance that the demand will be for progressively higher class lectures and entertainment features each succeeding year.

DEBATING AND PUBLIC DISCUSSION.

Through this department, package libraries of collected reports, articles clipped from magazines, newspapers, etc., are, upon request, shipped by mail or express to any section of the state. The packet library contains articles selected from the best periodical literature of the day. The selection, cataloging and packeting are the work of a staff of trained librarians who thus afford a service to the patrons of this department which would otherwise be almost beyond the means of even the best endowed student.

Debating societies are encouraged and assisted in program making, and in good presentation of discussions by library packets divided into affirmative and negative phases. Articles, data and references upon questions of moment are divided impartially, so that an individual or a community may form an intelligent opinion upon new questions of vital concern, or, more properly, upon the newer phases of old questions.

GENERAL INFORMATION AND WELFARE.

This is essentially a department of applied sociology, through which the service ideal, which has been mentioned above as animating the University, is offered to social groups, varying in importance from the neighborhood literary society to the important civic club, from the village and town selectmen to the administrative officers of the larger cities. It is the aim and object of this department, upon request, to supply, as well as may be, the demand for information, working programs and personal counsel upon problems which confront people living under the complex conditions of community life. At present the department is divided into three bureaus:

Municipal Reference.

Civic and Social Centers.

Public Health Instruction.

Bureau Municipal Reference.—To quote the director, Mr. Ford H.

McGregor: "The general purpose of this bureau is to collect data and information on subjects of municipal government and place it at the disposal of the citizens of the state who can benefit by it." Data are collected from cities throughout the country. The bureau is freely consulted by public officials and other citizens interested in municipal government. It is interesting, in this connection, to note that nearly 40 per cent. of the requests for information have come from outside Wisconsin—from officials and citizens whose acquaintance has been made only through the quest of the bureau for data upon their local ordinances and administration.

Civic and Social Center Bureau.—The purpose of this bureau is to stimulate organization of the people for the purpose of deliberating upon and discussing matters of policy in "the common business of citizenship."* The use of the public schoolhouse for meetings, lectures, exhibits and recreation is advocated and encouraged. In order that the organizations effected may be conducted in a systematic, orderly and purposeful manner, the employment of the school principal or some other public officer as secretary is urged. Under the conception upon which this bureau is operated, the use of the facilities which the public school building provides for the instruction of the young is urged for further educational opportunities to adults.

Before proceeding to a detailed description of the Health Instruction Bureau, a few words will be devoted to the

DISTRICT ORGANIZATION.

To facilitate distribution, and to secure the desirable contact of instructor with pupil (for the sake of the instructor quite as much as that of the student), the state is divided into districts. The accompanying map indicates the district organization. At present but five districts have been opened. Three will be opened in the next two years, and the balance as rapidly as the means at hand will permit.

The individual district employs a district representative, organizers and such instructors as demand for class instruction warrants. There should be no misconception that the district organization is merely a branch school. Its important function is to serve as the connection through which any of the service facilities of the Extension Division can be diffused, and through which the local needs and demands of the district can be concentrated and transmitted to headquarters.

HEALTH INSTRUCTION BUREAU.

The accompanying diagram indicates the organization, scope and design of present and proposed enterprises. The top line indicates the various

*Edward J. Ward, adviser.

departments and colleges of the university proper, upon which drafts will be made for the scientific knowledge and information. This will be focused through the Extension Division, where it will be recast into popular form and disseminated through the regular existing departments and agencies of the Extension Division described above.

The form in which the instruction is being and will be dispensed is shown in the long line, and the objective below.

Lectures.—It is the purpose to provide popular lectures upon disease and health problems in connection with the regular lecture courses, and independently when and where desirable. These lectures will be similar in character to those made popular by anti-tuberculosis organizations, the American Medical Association, etc.

Last year an experiment was made in promoting courses of didactic instruction to physicians in the newer aspects of bacteriology, physiology and chemistry. The classes were organized by salaried employees of the district organizations. Those who registered for the courses were charged a fee to cover the cost. It was significant that physicians, who never attended regular medical society meetings, paid for their admission and were most regular in their attendance throughout the courses of six lectures each, extending over as many weeks.

Study groups amongst physicians, nurses, teachers, engineers, etc., will be organized in the larger centers, particularly in the well organized districts of the Extension Division.

PUBLICATION.

Bulletins, Circulars, etc.—It is the intention to publish bulletins from time to time, which will be similar in form to the justly popular agricultural bulletins upon domestic animals. These, however, will be concerned with the housing, feeding, and general physical management of the human species.

An underlying series is in preparation upon the following subjects: Prevention of Disease, Infant Mortality, Rural Hygiene, Insanity, Venereal Diseases.

Following the publication of these, it is the intention to double back and extend the publication by rather more detailed and specific handling of the subjects only briefly touched in the broad scope contemplated in the above publication outline.

Newspapers.—A circular letter was recently sent to newspaper editors of the state with an enclosed reply sheet, in which they were asked if they desired a regular weekly service of brief articles upon health and disease, public sanitation, private hygiene, etc. Responses from over one hundred were received, in which they agreed to run the copy under a distinctive column head. As was expected and hoped for, the rural papers were the most responsive.

Editors were asked to indicate topics upon which they desired contributions. Their suggestions have been carefully noted and further suggestions and criticisms will be earnestly sought. It is hoped that thereby we can create a larger demand, and provide a satisfactory supply.

A most encouraging feature of the response was the fact that but six asked for "boiler plate" matter. To one who is familiar with the slow, tedious and relatively costly grind of hand composition in a small office, and the amount of pretty good "telegraphic news" (received by express ready to be locked in the forms), it is apparent that there is a real demand for authoritative, readable "copy" upon health. We were repeatedly warned against long, drawn-out, academic discussions upon abstruse, scientific subjects.

Expert Consultations (Community).—The Municipal Reference Bureau, described above, has already stimulated a demand for assistance upon various phases of municipal sanitation. With better facilities for supplying the expert service, the field can now be extensively and intensively cultivated. A sanitary engineer is employed by the Extension Division, and he, and other advisers, will, upon occasion, be sent to communities to gather data and devise plans and formulate working programs.

Information Bureau.—It is to be expected that a number of personal queries will be stimulated if the various projects are as successful as is fondly hoped for. As soon as these queries are sufficiently numerous to demand it, a distinct sub-bureau of information will be unavoidable.

CORRESPONDENCE STUDY.

Course for Local Health Officers.—Of greatest immediate interest at this meeting is the establishment of a Correspondence Course for Health Officers. Wisconsin is one of the few American Universities which is conducting a school for health officers. Not unlike the other American health officer's schools, there is a most regrettably small number of candidates for the degree of Doctor of Public Health. This is accounted for by the fact that as yet the expert health officer is not held in as great esteem as his importance would seem to warrant. The utilitarian purpose of furnishing better health officers—and through them better conditions as regard health—is thus being held in abeyance.

We are certain that there is need for more knowledge upon the part of the health officer of the small community and it seems possible that a demand may be stimulated (if it does not already exist) for a better working knowledge of the problem of public health administration.

The course is designed to cover about six weeks and to awaken an interest and open a door to further information for the student so inclined. The course is being written under the following outline:

A PROGRAM FOR CORRESPONDENCE STUDY.

Designed for Local Health Officers.

I. Laws and Regulations:

A general study of laws, board of health regulations and local ordinances for the purpose of familiarizing the officer with his powers and duties.

II. Vital Statistical Studies and Surveys:

To determine the relative importance of various disease problems.

III. Transmission of Disease:

- (a) Direct (contact infection).
- (b) Public and private water and sewage systems.
- (c) Foodstuffs.
- (d) Parasites and insects.
- (e) Studies in epidemiology (carriers, milk routes, vegetables, etc.).

IV. Nuisances:

- (a) Garbage.
- (b) Dust.
- (c) Manure.

V. Administration:

(a) Inspection: markets, homes, restaurants, factories, alleys, streets, schools, theatres, depots, etc.

- (b) Visiting nursing.
- (c) Medical inspection of school children.
- (d) Laboratory.
- (e) Quarantine and disinfection.
- (f) Registration.

The course is being written to be of practical assistance in the work-a-day administration of the rural and small community health board.

We earnestly beg that none shall gather the idea that we purpose making expert sanitarians by a few weeks' correspondence study. We do hope, nevertheless, to assist the conscientious official in a better administration of his trust. It is our ambition that, as time goes on, there will be a student here and there who will be awakened to the larger aspects of public health work and be led to continue his study in residence in the regular University School for Health Officers.

Medicine.—Correspondence study, I have said above, has been found, in many instances, to be equal to resident University work. If this be true, it will be only a question of time when it will be possible to offer physicians, nurses, teachers, etc., opportunities in systematic, orderly, post-graduate and research work under competent and stimulating supervision. Indeed, such courses have already been successfully given in bacteriology and hygiene, chemistry and pharmacy.

While it is true that many students can, and do, acquire splendid train-

ing without the aid of another master, most need to report to somebody at a given time in order that the quest may be consistently continued over as long a period as the pursuit of knowledge requires.

Exhibit.—A general health exhibit is now being gathered. It will consist of photographs, charts, models, etc., much the same as those which have characterized the tuberculosis, child welfare and sundry other health and welfare campaigns. It is the purpose to have the material so arranged that a single disease problem or any group of problems may be covered as indicated. A worker is devoting his time to the planning and manufacture of exhibits for the welfare department. The coöperation of various public institutions, such as sanatoria, trade schools, continuation schools, alms houses, the state's prison, reformatories, etc., is being enlisted. At such institutions, really expert assistance and workmanship, which could not be secured in the open market except at prohibitive cost, can be had. The even more important consideration is offered, that these workers are developing an interest and sympathy which must have a most wholesome educational influence. At present, a prisoner at one of the reformatories seems to have awakened a social consciousness, which, if it can be linked with his more than ordinary talent for cartooning, may return him to society as a useful and valuable leader. I hope that a manual may be issued upon exhibit making and that school children throughout the state may thus be encouraged to prepare charts, models, etc., for the education of their own communities.

Surveys.—At present, we have sufficient data, or can easily gather them from other available sources to meet general requirements. As the work develops, however, local and general surveys will be of incalculable assistance in giving point and direction ("the punch") to the instruction. To employ the limited time and money now available in research, when the existing knowledge is not being profitably utilized, would not be justified in the field that this bureau is designed to cover.

CONCLUSION.

Notwithstanding the length this paper has assumed, it is, even now, but a sketch of a conception to secure the coöperation and extend the usefulness of an existent and splendidly efficient educational machine. In recognizing its responsibility for ignorance, and in assuming its obligation to instruct, it would seem as though the University has taken a great stride toward the ultimate solution of one of the state's most disheartening problems. It is not even dreamed that a lifetime will see the promise fulfilled. Indeed, it is this very consideration which gives warrant to the placing of the task and responsibility for enlightenment upon such fundamental, and practical knowledge of life and of the business of living, upon our greatest Wisconsin public school instituted by the people for the people of all time.

PUBLICITY AND THE PUBLIC HEALTH.

P. M. HALL,
Minneapolis, Minn.

Read before the Section of Public Health Officials, American Health Association, Colorado Springs,
September, 1913.

At a recent New York conference on infant welfare, Dr. S. Josephine Baker, of the department of health of the city of New York, expressed the sentiment that 80 per cent. of infant welfare work is educational. It is not known by what system of mathematics Doctor Baker arrived at that particular percentage, but it is fair to assume that she did not place it any too high. It was shown at that meeting that probably greater advances had been made in the control of infantile diseases, both in the morbidity and the mortality, than in those of any other age period. Is it fair to assume that such excellent results have been brought about by the 80 per cent. of publicity?

Some recent statistical studies made from the recorded vital statistics for the state of New York brought out very prominently the fact that while up to forty years of age the expectancy of life has increased, this is not true with respect to the age periods beyond forty. Is it not probably true, then, that with a higher per cent. of education and publicity in all matters pertaining to public health—better food, personal and community hygiene, occupational diseases and the diseases of habit—better results above forty years of age might be attained?

It is safe to say that all public health work is, or should be, educational. I speak from experience both on the inside and what might be termed the outside of public health work. The public is eager to receive such education. It is apparent that within the last few years there has been a great awakening of interest in public health matters. Social workers, sanitary engineers and earnest lay workers are keeping pace with, if not actually outrunning, the regular, orthodox public health official. So I have thought it would be of some interest to this section to discuss in a brief way the relations between publicity and the public health.

My first awakening to the great benefits of publicity came in the year 1911. For nine months I had worked diligently to have the city council pass a new milk ordinance, only to see my pet project go down to defeat. The very next day the city editor of one of our prominent dailies made the proposition to me to conduct a column of instruction in the care of infants, to be known as "The Baby's Friend." This column, running through both morning and evening editions, was maintained with a daily change of

subject from early in June until September. In addition to a lead article, questions pertaining to the care and treatment of children were answered.

The effort met with immediate public favor, and I realized for the first time that I could reach the ears and understanding of the mothers of the 7,000 babies born in the city during the previous year. For a number of years the department of health had distributed the usual circular of information through the mails to the mother of every infant reported by the birth returns. This circular was the usual one, familiar to you all. But here was a medium turning out fresh, live material every day, brightened up by accounts of actual happening and local conditions, to point out the moral. The response was instant, immediate and unanimous. Nobody dissented. Everybody was pleased and it was with regret that the column was brought to a close in September.

The following year, 1912, the column was again maintained, meeting with increased favor. There was a material reduction in the number of deaths among infants for 1911 and still greater and better results along the same lines for 1912. We have been pleased to think that possibly the educational effort carried on through the *Tribune* had something to do with bringing about the result. And now that Doctor Baker has said that educational work constitutes 80 per cent. of the effort, we assume that the results were in a large measure due to that publicity.

So successful was the maintenance of the column that in November of 1912 the *Tribune* began a column of public health instruction under the title of "Health and Happiness," which has now become a regular feature of the paper. The *Minneapolis Tribune* was preceded in this field by the splendid work of Dr. W. A. Evans in the *Chicago Tribune*. To this distinguished apostle of health publicity we gladly give credit, as the pioneer in this work. The work of public health owes much in its rejuvenation to Doctor Evans. I venture the remark that no single effort has had more to do with the awakening along public health lines than the work he has done.

The last effort of the *Minneapolis Tribune* met with even greater success than was anticipated. From my humble connection with this work, I can say there are some things we have learned: First and greatest, is the eagerness with which the public has received the proffered instruction. The articles are read, cut out and treasured. The discussion of special topics has been eagerly sought and frequently asked for. The inquiries have been from all quarters and all grades of society. They have been for the most part intelligent, showing an earnest interest in the subjects discussed. This we have not considered as in any sense a personal tribute to the editor, but to be due entirely to the eager desire of the public to be informed. The idea has ever been kept in view that the articles should be instructive, rather than entertaining, and that they should express views and opinions that were sound and conservative.

Secondly, it has seemed that the popularity of the column has in a large measure been due to the fact that the information was given out by a medical man. The public is discriminating and while it may be entertained by the magazine lay writer on medical topics, it accepts the same merely as a good story. But when it comes to instruction in matters which pertain to right living, proper diet, etc., it will listen to a medical man as it will to no other. In this way, it is thought, publicity of this sort has done a great deal in turning the minds of the people back to the medical man as their natural medical adviser.

Thirdly, one of the greatest benefits has been the directing of attention to the evil effects of patent medicines and quack doctors. The ill effects of the recent tuberculosis cure were largely discounted all over this country by public health publicity. Bulletins of the departments of health, both city and state, informed the public of the true character of the alleged cure and the mischief which might have been done was largely averted.

Medical advertisements are being revised or dropped as public interest and the new awakening show better things. When it is considered that, as in the *Tribune*, 100,000 readers may be reached every day, and 160,000 in the Sunday edition, something of the enormous possibilities of educational work may be realized. When it is considered, too, that up to the present time hygienic instruction in the public schools has been meager, the possibilities of newspaper public health publicity loom large. It can be and is made the Macedonian cry in the Wilderness, for all new hygienic thought.

With a full knowledge of public health work, with twelve years of such experience behind me, I can truthfully say that in publicity the opportunities of doing real, effective public health work have broadened; that whereas we spent twelve years doing the 20 per cent., we are now in the more efficient position of doing even more thoroughly the 80 per cent. of educational work along enlightened lines, without one hampering drawback. An esteemed member of this organization once told me that he had an automobile which had fifty "exasperators." At that, I venture, the exasperations of his official position exceed in number those on his machine.

I, therefore, commend to the members of this association an extension of their publicity work, not only through their bulletins, but through the public press. The day is not far distant when every metropolitan newspaper will have its health editor as well as its dramatic, society or sporting editor.

PUBLICITY: SOME OBSERVATIONS ON ITS USES AND MISUSES.

J. SCOTT MACNUTT,

Orange, N. J.

Read before the Section of Public Health Officials, American Public Health Association, Colorado Springs, September, 1913.

The power of publicity has recently been strikingly illustrated in the widespread curiosity aroused among the general public and the agitation caused among thousands of tuberculosis sufferers by the newspaper notoriety of the alleged Friedmann cure. Could the health officers of this country give to a single important principle of hygiene the prominence achieved in a few days by that phenomenon, the saving in health and life would be incalculable. The forces of commercialism leave no stone unturned to find the most effective publicity methods, and by their skillful use of them outstrip by far those who should show an even greater enterprise in advertising for civic welfare and the good of humanity. The business school has its course in publicity; why should not the modern school of the health officer?

I take for granted that every board of health should carry on a constant, systematic, and more or less extensive campaign of publicity. Of course the places for sanitary education to begin are the home and the school. Only those institutions can lay the deep and firm foundations necessary for the hygienic welfare of the nation. But the education there may in many cases have been inadequate, and there are many other reasons besides why public health authorities should at the present time carry on publicity work with the purpose of obtaining action—or more frequently avoidance—on the part of the individual, either for his own personal safety or for the facilitation of administration.

A speaker before this association last year * proposed a suggestive analogy according to which the conception of Pasteur, that "it is within the power of man to cause all germ diseases to disappear from the earth," was to be capitalized and carried on as a commercial enterprise of the most profitable order. In the plan, publicity operations took a most important place. Now under the assumption that this is a meeting of the directors of that enterprise, the question naturally arises, "Are we doing our publicity work—our advertising—efficiently?"

This matter of advertising—of publicity made to pay—is not a simple one. Commercial advertisers used to think so until they found themselves

* Hoyt E. Dearholt, "Educational Publicity in Offense and Defense," *Am. Journ. of Public Health*, 1912, Vol. 2, No. 12.

spending millions on costly but utterly unpsychological, and therefore ineffective, schemes. They once looked askance at the college professor who suggested a modicum of psychological theory. But advertising has now become an applied science, and those same college professors are writing its text-books. In the matter of publicity methods we health officers stand, with few exceptions, where the advertisers stood some time ago. We are too apt to consider publicity as an activity of slight technique and sure effect. We have not made the acquaintance of the professor. Still, we can take consolation in reminding ourselves that, after all, it is not wholly a discredit that we are unfamiliar with a speciality not our own. Then, too, we can readily appropriate something of the advertiser's technique.

The uses of all modes of publicity are governed by a body of related psychological principles susceptible of study and proof. This is not the place for a detailed exposition of the art; but a glance at its first principles promises profit. Let me use as an illustration of these a poster (originated by the state board of health of Florida)—dealing with the fly nuisance—which has become widely and favorably known.* To recall it to mind I need only mention the caption, "From Flies and Filth to Food and Fever," surmounting a printed description of the habits of the house fly, the text being surrounded by a wide pictorial border in which flies are seen traveling in swarms from manure pile and privy vault to baby's bottle and family table. This poster illustrates clearly the three main principles of publicity.†

First, by its simple, striking, alliterative caption and unusual "make-up" of text and picture, it *attracts attention*.

Second, by its clear and vivid presentation, both by picture and by word, of a public health danger, it *makes a lasting impression*.

Third, by stimulating the imagination and feelings as to the dangers to health from the habits of the fly, it *creates a desire to act*—to do away at once and forever with this odious insect.

Let us analyze briefly the specific means, adapted to fundamental characteristics of the human mind, by which such effects as the above are produced.

Success in gaining attention, to begin with, depends upon the strong ingrained trait of curiosity. It is the novel, even to the point of the ridiculous or the grotesque, that human nature seeks. This part of the problem

* This example is chosen mainly because of the fact that it is widely known. Others as apt may be found. In this connection the posters issued by the Chicago Department of Health and reproduced in its weekly bulletin, as well as other matters appearing in that bulletin, will well repay examination.

† These principles are taken from an article by Stephen I. Colvin, professor of psychology in the University of Illinois, entitled "The Mistakes of Advertisers," in *The Independent* for September 5, 1912. There is now a very considerable body of literature treating of publicity and advertising. As a clear and non-technical exposition of principles, *The Psychology of Advertising* by Walter Dill Scott, director of the Psychological Laboratory of Northwestern University (Small, Maynard & Co., Boston, 1910), will be found especially valuable. See also *The Principles of Practical Publicity*, by Truman A. DeWeese (2d ed., Jacobs & Co., Phila., 1908, or Vol. 7 of the Business Man's Library, The System Co., Chicago, 1910), which is written from the standpoint of the practising advertiser.

is by far the easiest to solve, though there is unlimited scope for skill in making old principles appear fresh and new. The epigrammatic "health-grams" of the Chicago Department of Health exemplify such skill.

To gain attention, then, is not difficult, but to hold it and produce a lasting impression is a different matter. Clearness is a *sine qua non*; and it is upon this very first rock that the sanitarian in publicity sometimes founders. He is a scientific man, and science speaks in a jargon of its own. For purposes of convenience it uses a condensed, technical language, teeming with terms which are all too familiar to those who live by them but which are incomprehensible to the man in the street. They must be translated: words common must take the places of words uncommon, and plain, blunt Anglo-Saxon must be substituted for words of Latin origin. Compare in their effect upon the plain laboring man, just able to spell out words, the parallel phrases "Expectoration is prohibited" and "Do not spit."

With clearness must be reckoned simplicity, both in ideas and in language. The more popular the matter the fewer ideas can be introduced; a single point is often enough. At any rate the whole should be held together by one main idea. As to expression, idle words have no place in a statement where every word must work to the point of overstrain. The scientifically trained man has to resist the desire to explain with great exactitude and must let much go by inference. The "flies and filth" poster is not in this respect a model, for it would gain by condensation in the reading matter. Publicity rarely allows of details. Even the highly educated and rapid reader will not stop to peruse a circular or poster of more than say a hundred words on the same subject, much less carry away the sense of it all. The most effective advertisements of the day are those which rely upon a single phrase or even a single apt word for their effect. To test the underlying wisdom of this one needs only think of a few varieties of soaps, washing powders, fountain pens, cameras, and other articles of commerce and note the unconscious ease with which their respective trade mottoes slip into the mind. "Let the Gold Dust twins do your work" and the rest have become proverbs. "Swat the fly," though not a shining example of doctrine, is an admirable specimen of the epigram that roots itself in the minds of thousands.

The sanitarian in publicity has another difficulty to contend with in his tendency to miss the concrete. Public health science, though aiming at definite effects in a concrete world, nevertheless deals largely in things which require of the untrained mind considerable effort for visualization. A microscopic organism may be something pretty concrete to a bacteriologist who deals with it daily, microscopically or otherwise, but the layman's effort to visualize his descriptions has resulted in the grotesque microbe of the comic supplement. Homely analogies and emphasis on visible effects are antidotes for the tendency toward unfamiliar abstractions.

The psychologists tell us that memory, which we are here striving to make easy for the subjects of our publicity work, depends upon two things: vividness of impression and association of ideas. Discussion of the former would depend largely upon the nature of the mode of publicity used, for various kinds of impressions, visual, verbal, etc., would have to be taken into account. But association of ideas enters in much the same way into all processes. The strongest effect will be produced when the new idea to be inculcated is closely linked with an old idea already deeply rooted in the mind. A firm of tea importers has recently come out with a billboard advertisement reading "Honest tea is the policy," thereby linking to something which is a part of everyone's mental furniture a brand-new witticism—one so clever that the reader cannot help noting and remembering the name of the article which it advertises. Similarly the "flies and filth" poster forms a new set of associations, between the unfortunately familiar manure pile, etc., and the equally familiar baby's bottle and dinner table, based upon the unsanitary connection so vividly impressed.

The last, and most difficult, problem of the sanitarian in publicity is to create a desire to act in accordance with the principles set forth,—in a word, force. It is to this ultimate object that he has been leading up. Knowledge not used is knowledge valueless. Obviously, deep-rooted instincts should, if possible, be appealed to, and fortunately self-protection and solicitude for family and kin are such instincts. But there is a nobler instinct which should also be made a motive: the community feeling which in its highest transformation is charity for neighbors. The perfect result will have been achieved when the citizen acts wholly upon this motive, but it must be remembered that self-protection is the stronger. Personal or civic pride may also be effectively invoked. The problem in any case is to make the citizen feel that it is "up to *him*." It is he who composes "the public."

A word as to sensationalism. Why let the forces of evil and untruth create most of the "sensations," thereby debasing a good word and utilizing psychological forces of the greatest potency? Pasteur's threatened annihilation of all the germs on the earth, put forth as it was by a master mind of science, should have created one of the greatest sensations in history. Yet we do not hear of its having been cried through the streets of Paris, but only as an academic quotation only recently heard outside of laboratories. By all means let us have sensations in publicity—but tempered by accuracy and proportion! And let us strive to make the remedy as impressive as the evil.

Of the details of publicity campaigns, the various modes of publicity and their relative values, the necessity for persistence, and many other matters, there is no space here to speak. In any case they will depend not only upon general principles but also upon local conditions. It will readily

be admitted, I believe, that the first specific duty of the health officer in this field is to maintain, through carefully edited statements and through interviews, a good press service. After that the various other means—bulletins, circulars, other forms of literature, lectures, exhibits, and motion pictures—should fall into their proper places.

There remains, however, one inclusive means of popular education touching all classes of citizens, the ignorant and the educated, the willing and the unwilling, which deserves special mention because in the long run the most thoroughly effective in the power of the public health authorities. That is a good administration. The acts of such an administration shine through the press, every regulation enacted and enforced is a great public lesson, and every inspector and every nurse is an instructor teaching with authority. This is a fortunate fact, for, after all, efficient administration is the sum total object of the public health official. Thus through publicity it reacts beneficially upon itself. Good work made public, with the auxiliary influence of other modes of publicity, should result in the adequate support of administration through legislation, funds, and public coöperation.

IS DRIED BLOOD AS RELIABLE AS FRESH SERUM IN MAKING THE WIDAL TEST?

GUSTAV F. RUEDIGER and ROBERT HULBERT.

From the State Public Health Laboratory, University of North Dakota.

Read before the Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

There is a tendency on the part of some laboratory men and practising physicians to discredit the Widal test when carried out with dried blood, while, on the other hand, we find those who have implicit faith in it, even when performed in a kind of hit or miss fashion. There can be no doubt but that this laboratory test frequently is a valuable aid in diagnosis, provided that our findings can always be relied upon. It must also be stated that it is highly desirable that the same technic be employed in every laboratory in this country. We have always considered the test reliable when the technic employed is correct and this investigation was undertaken in the hope of getting definite data bearing on this point. According to Westbrook* a dilution of 1:25 of the whole blood is obtained by dissolving 1 mg. of the dried blood in .1 cc. of distilled water. This statement we were able to verify as is shown in Table I.

TABLE I.

SHOWING WHAT PER CENT. OF THE WEIGHT OF FRESH BLOOD IS REPRESENTED BY THE WEIGHT OF THE AIR-DRIED BLOOD.

Specimen number.	Weight of fresh blood.	Weight of air-dried blood.	Per cent. of original weight left after drying.
1	.018	.0046	25.5%
2	.023	.0063	27.4
3	.024	.006	25.
4	.061	.0148	24.
5	.0405	.0089	22.

Average 24.78%.

Approximately one fourth of the weight of the fresh blood is left after air-drying for twenty-four hours. It is clear, therefore, that a solution of 1 mg. of dried blood in .1 cc. of distilled water makes a solution of 1:100 of the dried blood or 1:25 of the whole blood.

*Jour. Infect. Dis. Supplement 1, p. 316.

Westbrook recommended that the reaction with dried blood be made with a dilution of 1:25 of the whole blood. It seemed desirable to us, therefore, to test a large number of normal bloods in this dilution, to determine what per cent. of these gives an agglutination of typhoid bacilli. We

TABLE II.

SHOWING RESULTS OF AGGLUTINATION TESTS WITH DRIED NORMAL BLOODS, AND FRESH NORMAL SERA.

Blood.	Dilution and Result.			Blood.	Dilution and Result.		
	1:25.	1:50.	1:100.		1:25.	1:50.	1:100.
1	§	*		18	§		
2				19	§		
3	*	*	†	20	†	§	§
4	§			21	§		
5	†	†	§	22	*	*	§
6	§			23	§		
7	§			24	§		
8	§			25	§		
9	§			26	§		
10	§			27	§		
11	§			28	§		
12	§			29	†	§	
13	†	§	§	30	§		
14	§			31	§		
15	§			32	§		
16	§			33	§		
17	§			34	§		
Tests with normal sera.							
Sera.				Sera.			
20	*	†	§	29	*	*	§
22	*	*	§				

* Complete clumping with cessation of motility.

† Clumping without complete cessation of motility.

‡ Very slight clumping (suggestive reaction).

§ No clumping.

accordingly tested the dried blood from thirty-four normal individuals, who gave no history of having had typhoid fever. Six of these, or 17.6 per cent., gave a positive reaction, and two of the latter group gave the reaction in a dilution of 1:50. From three of the persons whose dried blood gave

an agglutination of typhoid bacilli, we tested the fresh serum in dilutions of 1:25, 1:50 and 1:100. All gave a positive reaction in dilutions of 1:25, two in dilutions of 1:50, and none in dilutions of 1:100. The results of these tests are shown in Table II.

We also tested the dried blood of five individuals who gave a history of having had typhoid fever from four to twenty-four years previously; and of three individuals who had been vaccinated from eighteen to thirty months previously. Three of the former and all of the latter gave a reaction when used in a dilution of 1:25. When used in a dilution of 1:50 only two of the former but all of the latter gave a positive reaction. These are shown in Table III.

TABLE III.

SHOWING RESULTS OF AGGLUTINATION TESTS WITH DRIED BLOODS FROM PERSONS WHO HAVE HAD TYPHOID, OR HAVE BEEN VACCINATED AGAINST TYPHOID.

Blood.	When typhoid or vaccinated.	Dilution and result.		
		1:25.	1:50.	1:100.
1	Had typhoid 20 years ago.	§		
2	" " 16 " "	§		
3	" " 4 " "	*	*	§
4	" " 12 " "	*	†	†
5	" " 24 " "	†	§	§
6	Was vaccinated 2½ years ago.	*	*	No test.
7	" " 1½ " "	*	*	No test.
8	" " 1½ " "	*	*	†

Tables II and III show clearly that great caution must be observed in drawing conclusions from a positive agglutination test. This is becoming more important every day, because more people are availing themselves of the protection afforded by the anti-typhoid vaccination. Table II shows that a dilution of 1:25 is not permissible and that a dilution of 1:50 of the whole blood, or of the serum, is likely to give incorrect results in a small per cent. of our tests. Dilutions of 1:100 seem to give reliable results, if the patient gives no history of having had typhoid fever, or of having been vaccinated against typhoid. It must be admitted, however, that the reaction does not appear quite so early in this dilution, as will be shown in the following table.

Having made these preliminary determinations, we proceeded to determine whether or not a positive reaction can be obtained as early and as

TABLE IV.

SHOWING THE COMPARATIVE VALUE OF DRIED BLOOD AND FRESH SERUM
IN MAKING THE WIDAL TEST.

Typhoid patient.	Day of disease.		Dilution and results.							
			Dried blood.				Serum.			
			1:50.	1:100.	1:200.	1:500.	1:50.	1:100.	1:200.	1:500.
1	5		§				No test.			
	6		†	†			†	†		
2	5		§				No test.			
	7		*	†	§	§	*	*	†	†
Vaccinated person.	Days after initial injection.	Days after 2d injection.								
1	7		§	§			§	§		
	8	1	§	§			†	§		
	9	2	†	§			*	*	†	§
	10	3	*	†	§		*	†	§	§
2	5		§	§			§	§		
	7		†	§			†	§		
	8	1	*	*	*	†	*	*	*	*
	9	2	*	*	*	†	*	*	*	†
3	7		§	§			§	§		
	9	2	*	*	*	†	*	*	*	†
	10	3	*	*	†	§	*	*	*	†
4	6		†	§	§		†	†	§	
	7		†	†			†	†	§	
	9		*	†	†		*	*	*	
5	6		*	§			*	†	§	
	7		†	†	†		†	†	†	
	9		*	†	†	†	*	*	†	
6	7		†	§			†	§		
	9		*	†	§		*	*	*	
							§			
7	6		§				§			
	9		†	§			*	†	§	
8	7		§	§			†	§		
	9		†	§			†	†		
	15	5	*	†	§		†	*	†	§

SHOWING THE COMPARATIVE VALUE OF DRIED BLOOD AND FRESH SERUM
IN MAKING THE WIDAL TEST.—*Continued.*

Typhoid patient.	Day of disease.		Dilution and results.							
			Dried blood.				Serum.			
			1:50.	1:100.	1:200.	1:500.	1.50.	1:100.	1:200.	1:500.
Vaccinated person.	Days after initial injection.	Days after 2d injection.								
9	7		§	§			§	§		
	9		†	†			†	§		
	15	5	*	†	†		*	†	†	§
10	6		†	§			†	†	§	
	7		†	*	†		*	†	†	
	9		†	*	†	†	*	*	*	
	6		†	§			†	§		
11	7		†	†	§		†	†	§	
	9		†	†	§		†	*	†	
12	6		*	†	§		*	*	†	
	7		†	†	†		*	†	§	
	9		†	†	†		*	†	†	
13	6		*	†	§		*	†	†	
	7		†	†	§		*	†	†	
	9		†	†	†		*	*	*	
14	5½		§	§	§		†	†	§	
	7		†	§	§	§	*	†	§	
	8½		*	†	†	§	*	*	†	§

† Blood before the injection gave a positive reaction in a dilution of 1.50.

constantly with dried blood as with fresh serum of patients who are in the early stages of typhoid fever. To settle this point it is only necessary to make Widal tests at frequent intervals with both the dried blood and fresh serum (in the same dilution) of these patients during the first and second weeks of the disease. Unfortunately, we did not have an opportunity to study the blood of more than two patients in this manner, but we vaccinated a number of persons against typhoid and kept close track of the appearance of the agglutination reaction in the dried blood and fresh serum of fourteen vaccinated persons. The results of our tests are shown in Table IV.

The table shows that dried blood gives a positive reaction just as con-

stantly as fresh serum. In no case did we fail to get a good reaction with the dried blood when we got a reaction with the fresh serum, but in a large proportion of the cases, the reaction with a dilution of 1:100 of dried blood appeared about a day later than with the same dilution of fresh serum. It will be noticed, however, that this is due solely to the dilution. If the serum gave a reaction in 1:100 dilution on a certain day and the dried blood failed to give it, the latter would bring about clumping if used in a 1:50 dilution. If, therefore, we were making all tests with a 1:100 dilution, a positive

TABLE V.

Specimen No.	Age of dried blood.	Dilution and result.			
		1:50.	1:100.	1:200.	1:500.
Patient 1.....	1 day	*			
	3 days	*			
	5 days	†			
Patient 2.....	1 day	*			
	3 days	*			
	5 days	†			
Patient 3.....	1 day	*			
	3 days	*			
	5 days	*			
Vaccinated 1.....	1 day	*	†	§	
	5 days	*	*		
	15 days	*	†	§	
	69 days	†	§		
Vaccinated 2.....	1 day	*	*	*	§
	5 days	*	*	†	
	15 days	*	*	†	
	69 days	*	*	No test.	
Vaccinated 3.....	1 day	*	*	†	
	5 days	*	*	†	
	15 days	*	*	†	
	69 days	*	*	No test.	

reaction would often be obtained a day later with dried blood than with fresh serum. In all our experiments the blood was collected on pieces of aluminum foil and air dried for about twenty-four hours, whereas the serum was used within a few hours after it was obtained from the person. All dilutions of dried blood were made by accurately weighing out from 2 to 5 mgs. of the material on a chemical balance and dissolving it in .5 per cent. saline solution in a small test tube. It is quite immaterial how much of the dried blood is weighed out as we add to it .2 cc. of salt solution for every milligram of dried blood. This gives a fairly accurate dilution of 1:50,

and the weighing requires very little time. We do not believe that the dilution can be judged accurately enough by the color to give dependable results. If the test is worth making at all it is worth the small amount of extra time required for weighing the specimen and having it right, instead of guessing at it and allowing the test to fall into disrepute among those who use the laboratory. After adding the salt solution to the blood, the mixture was allowed to stand for thirty minutes, with occasional agitation. It was now centrifugated for a few minutes in a rapid centrifuge, and hanging drops made by placing two loopfuls of the clear liquid on a cover glass and adding a very small loopful of a twenty-hour typhoid culture. The preparations were placed in the incubator for one hour before examination. Our large loop for the blood solution is two millimeters in diameter inside, and the small loop for the culture is about three fourths of a millimeter in diameter.

It seemed an interesting problem to determine how long the agglutinating property is preserved in specimens of dried blood. We, therefore, preserved six specimens of dried blood in clean Petri dishes and determined their agglutinating power at intervals of several days with the results shown in Table V.

Our results show that there is no appreciable deterioration of agglutinins in a specimen of air-dried blood during the first five days. In fact, we did not get much evidence of deterioration after two weeks. In routine work of the state laboratories, probably all specimens are used within three days after collection, and there is no danger of deterioration in that space of time.

CONCLUSIONS.

We believe that the following conclusions may be drawn from this investigation:

1. Dried blood is as reliable as fresh serum for making Widal tests, provided that the blood is properly collected and dried on pieces of aluminum foil.
2. Dried blood must not be used in dilutions of 1:25 of the whole blood. Dilutions of 1:50 appear to give a small per cent. of incorrect positive reactions and we, therefore, recommend that dried blood be used in dilutions of 1:75 of the whole blood. In this dilution the reaction will appear about one day later than in the same dilution of fresh serum.
3. Dilutions of dried blood should be made by weighing out several milligrams of the material and dissolving it in .3 cc. of .5 per cent. salt solution for every milligram of dried blood.
4. Agglutinins in dried blood do not appreciably deteriorate in two weeks and hence there is no danger of having the specimen spoil while in transit.
5. No conclusions can be drawn from a positive Widal reaction with the blood of a person who has been vaccinated against typhoid within at least two and a half years, or who has previously had the disease.

VITAL STATISTICS IN SOME MUNICIPAL REPORTS.

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Read before the Joint Session of the Sections of Municipal Health Officers and Vital Statistics, American Public Health Association, Colorado Springs, September, 1913.

The importance of vital statistics in the work of the municipal health officer may be judged from the amount of space given to this subject in the printed reports and bulletins of our city health departments. I have recently made an examination of the annual reports and bulletins emanating from the cities of 50,000 population and over in the United States, according to the census of 1910, and prepared a table showing some of the conditions found.

There were 109 cities of this size, out of which number the annual reports of eighty-six were available for either 1910, 1911, or 1912. In these eighty-six reports there were about 6,395 pages devoted to matters of public health, of which 1,782 pages, or 27 per cent., consisted of tables or discussions of vital statistics. The fact that over one fourth of the permanent printed records of the activity of the municipal health departments of the country consists of vital statistics would seem to indicate that great care should be taken to make such records accurate, precise, and thoroughly comparable with those of other cities, of the states, and of the nation. Yet it is extremely difficult, in a very large proportion of cases, to obtain exact information in regard to some of the most elementary facts, such, for example, as the total number of births (living births, exclusive of stillbirths), the total number of deaths (again exclusive of stillbirths but inclusive of all other deaths of children born alive that occurred in the area under consideration), or the causes of death (properly compiled in accordance with the International List, and hence *comparable* with the statistics of other offices). I may summarize briefly some of the facts brought out with reference to a few important items on which there should be uniformity:

SUMMARY OF EXAMINATION OF CITY REPORTS.

Total number of cities having a population of 50,000 or over in 1910.....	109
Annual reports available for 1910 or later.....	86
Report year identical with calendar year.....	70
Fiscal or other year than calendar employed (very undesirable)	16
Total populations as given in sixty-seven city reports.....	21,211,743
Total populations in census reports for same cities and years	21,061,759

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Total deaths in sixty-seven city reports	326,884
Total deaths, stillbirths only excluded, in corresponding census returns	326,505
Total death-rate based on sixty-seven city reports	15.4
Total death-rate (stillbirths excluded) based on census returns for same cities and years	15.5
Number of cities whose annual reports (main tables of deaths)—	
State that stillbirths are included in total deaths	12
State that stillbirths are <i>not</i> included in total deaths	24
Fail to make an explicit statement as to inclusion or exclusion of stillbirths	50
Classification of causes of death:	
International List (Second Decennial Revision, in effect January 1, 1910)	38
International List (First Revision, in effect from 1900 to 1909; should be replaced by Second Revision)	17
Other classification than International or no classification	31
Total pages relating to public health in eighty-six reports . .	6,395
Tables and text relating to vital statistics	1,782
Per cent.	27

It is difficult to make and maintain a complete collection of the annual health reports, even of our larger cities. In some instances reports may have been published, although they were not obtainable by the census. The summary includes only eighty-six annual reports, instead of one for each of the 109 cities in the group.

The general appearance of the "five-foot shelf" containing these reports is, on the whole, favorable. Some of the reports are published individually, others as part of the annual volumes of city documents. For convenience, it is desirable that the matter relating to public health and including the vital statistics should be available separately, at least in a limited edition. It is favorable to the adoption of uniform tables for city reports that practically all the publications are of the common octavo size. The only exceptions noted are the annual reports of Hudson County, N. J. (pamphlet form, including Jersey City, Hoboken, etc.), New York, and St. Louis, which slightly exceed the usual dimensions.

At the outset one is met by the difficulty that a considerable proportion (nearly one fifth) of the eighty-six reports examined are for years other than the calendar year. This makes the compilations practically worthless for many purposes of comparison—unless the reader cares to go to the trouble of a recompilation of the data, when possible, by calendar years—and involves special estimates of population for the middle of the fiscal or other year used, if precise rates are to be obtained. Of course this condition is

a relic of the practice of making the reports on vital statistics conform to the other reports made for the fiscal year. Some states formerly compiled their registration reports for fiscal or other odd years, but the practice has generally—I believe entirely—been discontinued. I would recommend that all city reports on vital statistics adopt the calendar year as a basis. In many cases there would be no difficulty and no legislation necessary if the city health officer should decide to adopt this plan. The sixteen cities of 50,000 or over that used other than the calendar year are the following:

Los Angeles, Cal.	St. Louis, Mo.
San Francisco, Cal.	Paterson, N. J.
Louisville, Ky.	Trenton, N. J.
Portland, Me.	Albany, N. Y.
Holyoke, Mass.	Schenectady, N. Y.
Detroit, Mich.	Dallas, Tex.
Grand Rapids, Mich.	Houston, Tex.
Kansas City, Mo.	San Antonio, Tex.

The general comparison with respect to the populations employed in the annual reports as the bases of vital rates is very satisfactory. The sixty-seven cities for which comparisons were available showed an aggregate of estimated population (21,211,743) only slightly in excess (0.7 per cent.) of the corresponding figures (21,061,759) in the census publications. Possibly a greater difference would be shown at a period more remote from the date of the census. There would seem to be little tendency to overestimate.

The total number of deaths for the same group of sixty-seven cities (326,884) also slightly exceeded the number compiled by the census for the same cities and years (326,505). The difference, only 379 deaths, may not fully represent deaths not returned because the figures for certain city reports include stillbirths. The death-rates based upon the city and census compilations are practically identical, namely, 15.4 and 15.5 per 1,000, respectively.

Of the eighty-six cities considered, twelve include stillbirths in their tables of deaths. This is contrary to Rule No. 4 adopted by this association in 1908 and to prevailing statistical practice at home and abroad. It is to be hoped that the cities embraced in the following list will discontinue the inclusion of stillbirths in their tables of deaths:

Denver, Col.	Allentown, Pa.
Evansville, Ind.	Johnstown, Pa.
Indianapolis, Ind.	Reading, Pa.
Covington, Ky.	Pawtucket, R. I.
Grand Rapids, Mich.	Dallas, Tex.
Youngstown, Ohio.	San Antonio, Tex.

It is still more unfortunate that many cities (fifty in number) do not comply with the rule of practice (Rule No. 14 adopted in 1908) requiring a definite statement as to the exclusion of stillbirths in the headings of the main tables relating to deaths. Nothing is more annoying and perplexing than to be uncertain in this respect when endeavoring to compare data from various cities, and the rule should be strictly followed in the preparation of all reports and bulletins relating to births and deaths. In only twenty-four of the eighty-six reports were the headings explicit in this respect. Following is the roll of honor:

San Francisco, Cal.	St. Louis, Mo.
New Haven, Conn.	Manchester, N. H.
Chicago, Ill.	Cincinnati, Ohio.
Peoria, Ill.	Columbus, Ohio.
Terre Haute, Ind.*	Toledo, Ohio.
Baltimore, Md.	Charleston, S. C.
Boston, Mass.	Memphis, Tenn.
Fall River, Mass.	Nashville, Tenn.
Lawrence, Mass.	Houston, Tex.*
Springfield, Mass.	Salt Lake City, Utah.
Worcester, Mass.	Richmond, Va.
Detroit, Mich.	Spokane, Wash.

Another and most important feature of a city mortality report is the statistical classification of causes of death. The adoption of the International system, as recommended by this association at Ottawa in 1898, first rendered possible the general comparability of international mortality data. The classification has twice been revised since then, first at Paris in 1900, for use during the ten years 1900 to 1909, and again at Paris in 1909 (Second Decennial Revision), for use during the decade beginning January 1, 1910. The use of the first revision should have been discontinued after the second revision went into effect, nevertheless we find a considerable number of city offices (seventeen) still using the old form. Some of the offices attempting to make use of the International List, either in its original or revised editions, have seen fit to modify it, sometimes even adding new divisions or groups, so that the purpose of uniformity and comparability is entirely or largely defeated. Other offices (thirty-one) have not yet, apparently, realized the necessity of using the uniform and accepted system; some of these employ systems of local origin, obsolete classifications, or even mere alphabetical lists.

With all the aid afforded by the Manual of the International List of Causes of Death, published by the Bureau of the Census, satisfactory assignment of terms is extremely difficult and requires much professional

*Premature births are also excluded.

knowledge and technical training. Hence competent city registrars are necessary, and even with these a certain amount of discrepancy may exist on account of differences of classification of causes jointly returned. The full and satisfactory solution of the problem is not yet in sight, but the course of improvement will surely lie in the adoption and conscientious use of a uniform list by capable officials.

There are many other features of importance to which I might call your attention, but I believe that it will be better to leave the subject with weight upon only a few principal items, namely:

(1) Adoption of the calendar year when that is not in use.

(2) Strict adherence to the Rules of Statistical Practice recommended by this association with respect to the statement of total births and total deaths, with exclusion of stillbirths but with the inclusion, for deaths, of *all* deaths of persons born alive, even of the youngest infants, whether prematurely born or born at full term, provided they *lived* any time whatsoever.

(3) Use of the International List of Causes of Death in its latest revision. The abridged form can be used if desired, or it can be expanded without loss of comparability, as shown in the excellent tables presented in the reports of San Francisco and Washington. A reprint of the Manual of the International List, with some additions, is now in press and a copy will be sent to all registration officials requesting it.

What is the value of the vital statistics that constitute over one fourth of all the reports on public health published by our city administrations? Certainly not as great as it should be, but still sufficient on the whole to warrant much more than the attention that has been given them. There is an ample field for statistical work, and statistical work of the highest character, in the study of the vital statistics of individual cities. Each city is a problem in itself and one which the state registration service, much less the Federal service, can touch only in a few high places. Even the available data are not fully employed, and we have few city reports that begin to work up the material at command as fully as do those of the more advanced foreign countries.

THE NEW VITAL STATISTICS LAW OF NEW YORK STATE.

EUGENE H. PORTER, M. A., M. D., Dr. P. H.,
State Commissioner of Health,
Albany, N. Y.

Read before the Section on Vital Statistics, American Public Health Association, Colorado Springs,
September, 1913.

We all realize the importance of the complete registration of births and deaths. While we have been able to bring about a satisfactory registration of deaths occurring in New York State under the present registration laws, we have long felt the need of a more stringent law, properly enforced, if we were to succeed in obtaining complete returns of births.

The State Department of Health for several years past has recommended legislation to correct existing defects in our laws, but, as you know, questions affecting the public health are among the last to receive attention from the legislature, and each year has seen the legislature adjourn without having enacted the legislation desired.

The legislature has finally given us the desired power by the enactment of Chapter 559 of the Laws of 1913, amending the Public Health Law generally. The state commissioner of health is now charged with the general supervision over the work of all local health authorities in the state, and with the enforcement of the Public Health Law and the State Sanitary Code, excepting in the City of Greater New York.

Following the enactment of the general revision of the public health law came the important task of securing an effective registration law, and just before the close of the legislature a law conforming closely to the provisions recommended in what is known as the "Model Registration Law" was enacted, constituting Chapter 619 of the Laws of 1913.

The new vital statistics law places the registration of births, deaths, and stillbirths under the immediate supervision of the State Department of Health and applies to all registration districts in the state outside of the territory comprising Greater New York.

Each town, village and city constitutes a separate registration district, but the state commissioner of health may combine two or more primary registration districts to facilitate registration.

Present registrars of vital statistics will serve until the first of next year, when the new law goes into effect and appointments will be made for a term of four years. In towns, the registrar will be appointed by the town board, in villages by the village board of trustees, and in cities, unless the

city charter provides otherwise, the registrar will be appointed by the mayor.

The public health council is authorized to prescribe the qualifications of local registrars, as well as the health officers and district sanitary supervisors, who are charged by law to aid in making the registration of births and deaths complete in each registration district.

Local health officers are eligible for appointment as registrars, and if so appointed and if receiving a salary as health officer equivalent to fifteen cents per inhabitant of the registration district, shall serve as registrar of vital statistics without extra compensation.

Local registrars are authorized to appoint a deputy and sub-registrar, if deemed necessary, with the approval of the state commissioner of health.

Each such registrar is charged with the strict and thorough enforcement of the law, and must report any violation of the law immediately to the state commissioner of health, who shall report cases of violation to the district attorney of the county in which they occur, and the district attorney is required to forthwith prosecute such violations. Upon request of the commissioner of health, the attorney-general of the state is required to assist in the enforcement of the provisions of the law.

Any registrar, deputy or sub-registrar, who, on the judgment of the state commissioner of health, fails or neglects to discharge efficiently the duties of his office, or fails to make prompt and complete return of births and deaths to the State Department of Health, within the time prescribed by law, shall be forthwith removed from office by the commissioner of health.

If the local registrar fails to enforce the law requiring the prompt reporting of births and deaths, and to file certificates of same with the state commissioner of health on or before the fifth of each month, the state commissioner of health is authorized to send a representative to take charge of the local registration and secure complete registration in such district, the expenses incurred thereby to be paid by the town, village or city comprising the registration district.

Each registrar is required to carefully examine each certificate of birth or death, when presented for recording, in order to ascertain whether the record is made out in accordance with the provisions of law and instructions of the state commissioner of health, and no certificate shall be accepted until properly filled out.

Physicians and midwives are required to file certificates of births attended by them with the local registrar within five days after the birth occurs.

Whenever the certificate of a birth of a living child is filed with the registrar without the given name of the child, the registrar is required to send a supplemental report blank to the parents who shall fill out same, giving the name of the child in full, and file the record with the registrar, as soon

as the child is named, and such record shall be entered upon the birth register and filed with the original certificate of birth.

All superintendents or managers, or other persons in charge of hospitals, almshouses, lying-in or other institutions, public or private, to which persons resort for treatment of diseases, or confinement, are required to make a record of all of the personal and statistical particulars required in the forms prescribed by the State Department of Health for the registration of births and deaths, and every birth or death occurring in such institutions must be promptly reported by the attending physician.

When deaths occur without medical attendance, and the circumstances of death do not tend to show death due to unlawful act or neglect (in which case the matter should be referred to the coroner), the health officer is required to investigate and certify as to the cause of death.

Undertakers are required to obtain the medical certificate of death from the attending physician and after obtaining the family history and other information necessary to complete the record, over the signature of the informant, file the certificate of death with the registrar of the district in which the death occurred, and obtain a burial or transit permit before removing the corpse for burial.

Physicians are required to use greater care in filling out certificates of death, giving the cause of disease in sequence of causes resulting in the death. Indefinite terms, denoting only symptoms of disease or conditions resulting from disease, shall be held insufficient, and local registrars must not issue a burial or transit permit until the physician files a definite and satisfactory statement as to cause of death.

All births and deaths must be reported on blank forms prescribed by the state commissioner of health and furnished local registrars by the department without cost. Midwives are not allowed to sign certificates of death for stillborn children.

The body of any person whose death occurs in the state, or which shall be found dead therein, shall not be interred, deposited in a vault or tomb, or cremated or otherwise disposed of or removed from or into any registration district, or temporarily held pending further disposition more than seventy-two hours after death, unless a permit for burial, removal, or other disposition thereof shall have been properly issued by the registrar of vital statistics of the registration district in which the death occurred or the body was found.

No such burial or removal permit shall be issued by any registrar until, when practicable, a complete and satisfactory certificate of the death has been filed with the registrar. In case death occurred from a communicable disease, no permit for the burial, removal or other disposition of the body shall be issued by the registrar except to an undertaker duly licensed under the provisions of Chapter 71 of the Laws of 1913.

The state commissioner of health is required to furnish local registrars with a list of diseases which are considered infectious or contagious, so that when a death occurs from such disease proper precautions may be taken to prevent their spread.

No person in charge of any premises on which interments or cremations are made shall inter or permit the interment or other disposition of any corpse unless it is accompanied by a burial, cremation or transit permit. They are required to keep a record of all bodies interred or otherwise disposed of on the premises under their charge, giving the name of deceased, date and place of death, date of burial or disposal, and name and address of the undertaker, which shall at all times be open to public inspection. Where there is a cemetery or burial ground having no person in charge, the undertaker is required to file such report with the local registrar within three days after burial takes place.

Every physician, midwife and undertaker is required to register his or her name and address with the registrar of the district in which he or she resides, or may hereafter establish a residence. At the close of each year the local registrars are required to file such list with the State Department of Health. No registration fee is charged.

Under the new law the fee of twenty-five cents formerly allowed physicians for reporting births and deaths has been cut out, such service being required by law as a part of their professional duties, and physicians being protected by law in the practice of their profession owe it to the state to promptly report every birth and death, as well as cases of communicable diseases, to the local registrar and health officer, to protect the public health.

Local registrars are entitled to a fee of twenty-five cents for each birth and death certificate, properly filled out and recorded in their register, if the returns are forwarded to the State Department of Health within five days after the close of each month; and, no certificates being recorded during any month, the registrar is entitled to a fee of twenty-five cents for reporting such fact to the State Department of Health.

All certified copies of birth and death certificates must be obtained from the State Department of Health, and are to be furnished by the commissioner of health upon receipt of a fee of one dollar for each record furnished under the law. A fee of fifty cents for each hour or fractional part thereof spent in making searches for records not found on file in the department, or for which no certified copy is requested, is to be paid by the applicant for such record.

If any time within ten years of the birth, or one year of the death of any person within the state, a certified copy of the certificate of such birth or death is required, and it shall be found that the original certificate of such record is not on file in the department, the state commissioner of health shall immediately require the physician or midwife who was in attendance

and filed or neglected to file the certificate thereof, if he or she be living, to obtain and file at once with the local registrar such certificate in complete form as the lapse of time will permit, together with a fee of \$5, which shall be transmitted to the state commissioner of health and accounted for as a fee for certified copies.

It is the purpose of the State Department of Health to see that the provisions of the new vital statistics law are rigidly enforced. With the complete registration of births and deaths occurring in the state and the additional powers conferred upon the department by our new health laws, we hope to take a great step forward in public health work during the next few years.

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TUBERCULOSIS AND HOUSING.

"Tuberculosis and bad housing have long been bed fellows," writes Phillip S. Platt, M. A., of Scranton, and he goes on to say that it is very easy to have such a scape-goat but, at the same time, it is wise to look more deeply into the question and face the facts frankly. The question which he takes up directly is "Does bad housing as expressed in room overcrowding produce or favor tuberculosis? Is the death-rate higher in bad buildings?"

The figures of such congestion have been assembled by various authorities and from them come some curious facts. Glasgow with twenty-six times as large a proportion of one-room tenements as Belfast, and with fifty times as many persons in one-room tenements with five or more occupants each, has a mortality rate for consumption 43 per cent. lower

than that of Belfast. It is realized that Scotland has conditions of bad housing, but in spite of them there is a marked decrease in Scotland's phthisis. In Paris the housing conditions are considered very bad. One-fourth of the whole number of families in the city live in one room and three-fourths in three rooms or less. In Berlin one-half the families live in single rooms. In the former the consumption rate has remained stationary; in the latter the rate has decreased in twenty-five years about 45 per cent. In Norway the phthisis rate has increased by nearly 40 per cent., while there has been a lowering of the number of one-room tenements by nearly 33 per cent. New York in spite of its very dense population has been able to reduce its tuberculosis death-rate enormously and the same or greater improvement is noticeable in Boston. Summing up the matter, improvements in housing accompanies mortality decrease in England and Scotland but with increasing rates in Ireland and Norway, stationary rates in Paris and great decrease in Germany, Berlin, and New York. There are, of course, other factors but such facts as these suggest caution in arguing the effect of crowded houses.

Taking up another aspect of the health problem, the general and the infant mortality, the district figures of Boston are of exceeding interest for it is shown that, although better general health is evident in districts that are sparsely settled, it is the districts that are moderately congested that furnish the highest mortality rates. In 1911 and 1912, Ward 7, which has thirty-eight persons to the acre, showed the highest total mortality of any ward in the city. Ward 8, the most crowded, with one hundred ninety persons per acre, had the lowest total mortality (in central wards) save one in 1911 and 1912, the lowest infant mortality in the first-named year and next to the lowest in 1912. These comparisons are in districts of moderate and greatest congestion. Not only in Boston but in Glasgow and other important cities of the world has attention already been diverted from crowded houses to other causes and it is evident that the question of race-component may be a more important one than the question of housing.

For decency's sake, for morality and for ethical reasons, the demand for better housing should never cease, but sanitarians must begin to divert their attention to racial and other factors of population.

Correction in Article on School Ventilation in New York City Schools.

Through an error in computation, the estimates of mouth streptococci in New York school-room air, cited in my article on School Ventilation in New York City in the *AMERICAN JOURNAL of PUBLIC HEALTH*, November, 1913, page 1160, were based on the total volume of air filtered (868 cubic feet), whereas only one-fifth of each cubic foot was actually examined for these organisms. Where it is stated that six streptococci were found per 100 cubic feet of air the figure, therefore, should be thirty instead of six. The average numbers for the individual schools range, for the most part, between 10 and 35 per 100 cubic feet. In the crowded school in a poor district the number was 75, and in the school in the good, semi-suburban district no streptococci were found in 8 cubic feet. The ratio of mouth streptococci to total bacteria should be 1-320 instead of 1-1600.

C.-E. A. Winslow.

THE ESTABLISHMENT OF A SANITARY INDEX BASED UPON CERTAIN SPECIFIC MORTALITY RATES.

WILMER R. BATT, M. D.,
State Registrar, Pennsylvania.

Read before the Joint Session of the Sections on Vital Statistics and Municipal Health Officers,
American Public Health Association, Colorado Springs, September, 1913.

General mortality rates are truly the hope and despair of sanitarians. They are the first fruits of the accurate registration of deaths, and as such are exceedingly precious. Their importance is fundamental, and not to be denied or under-estimated, as their achievement marks the first goal of an ambitious public health service.

They have, however, very decided limitations, which become quite apparent when comparisons based upon them are attempted between countries, states or municipalities.

Recognizing the fact that age and sex exert a very decided influence upon general or crude mortality rates and that certain localities are, by reason of an unfavorable distribution of population concerning these two factors, entitled to a credit, when their general death-rates are compared with localities more fortunately situated in these respects, efforts have been made to equalize these differences by computing corrected death-rates based upon a standard distribution of population in so far as sex and age are concerned.

The registrar-general for a number of years has done so for the principal towns of England, and, more recently, for the principal European countries.

The Federal census office in the bulletin on mortality for the year 1911 has done the same for the states and principal cities of the registration area, using the standard million population of England as a basis, as this was found to agree very closely with the sex and age distribution of the United States as a whole, as shown by the census of 1910.

The term "corrected," which has been used to designate these calculated rates, will, at the suggestion of Doctor Wilbur in *Mortality Bulletin No. 112*, be changed to "standardized," by the English authorities, as the latter term more truly indicates the process involved; and, as the registrar-general emphasizes in his report for 1912, it is quite possible that refinements other than in age and sex may soon be acquired.

These results are admirable so far as they go, and illustrate the growing tendency to more intensive inquiries into special factors which contribute definitely to mortality rates.

It must be quite apparent, however, from a comparison of the general and standardized death-rates of the several countries of Europe, as contained in the registrar-general's report for 1911, that the several nations possess widely varying rates entirely independent of sex and age distribution.

Thus, Russia with a crude rate of 32.80 and a standardized rate of 28.61; Hungary with a crude rate of 26.34 and a standardized rate of 24.87; Austria with a crude rate of 24.83 and a standardized rate of 23.12; and Italy with a crude rate of 22.72 and a standardized rate of 20.23, are in marked contrast with England's rate of 17.16, Belgium's crude rate of 18.53 and standardized rate of 17.68, and Sweden's crude rate of 16.78 and standardized rate of 13.88.

When we consider that it is from the countries first mentioned, with their high crude and high standardized rates, that the United States has drawn largely by immigration, and that these immigrants with distinct racial habits have concentrated in a marked degree in certain states and municipalities,—it is quite evident, if we would equalize for purpose of comparison, that there should be a further correction for nativity in the various portions of the United States, where the percentage of foreign born ranges from 1 per cent. in the South Central group of states to 27.7 per cent. in the New England, and 25 per cent. in the Middle Atlantic states.

It is likewise true that our southern states would be entitled to a correction based upon color, as the negro race has a distinct mortality rate, and the distribution by color ranges from 1 per cent. in the Northeastern to 33 per cent. in the South Atlantic group.

We know also that industries have a decided influence on mortality rates, and that certain of our states might justly claim a correction based upon hazardous occupations.

These and similar facts would seem to emphasize the difficulties to be encountered in any attempt to establish a level basis of comparison as to mortality conditions in different places, by the correction, or standardization, of the general death-rates.

We are at the present time engaged in a sanitary warfare, but without an accepted and comparable method of measuring sanitary efficiency.

For practical purposes, it would, therefore, seem proper to concern ourselves with certain existing specific death-rates, and from these endeavor to establish a sanitary index, which, regardless of age, sex, nativity, color or occupation, would give us a very fair basis upon which to form some opinion as to sanitary efficiency.

The activities of health officials do, or should, certainly embrace a control over the communicable diseases which have a tendency to become

epidemic in character, and over mortality which is the result of definite insanitary conditions.

A sanitary index should, therefore, include deaths from those communicable diseases embraced in titles 1 to 16 of the International Classification, excluding possibly influenza, cholera nostras and dysentery. It should include deaths from tuberculosis in all forms, and the deaths of infants under one year of age. These three groups would seem to cover quite effectually the field embraced in the activities of an efficient health service.

In order to estimate, if possible, the value of such a sanitary index, a group of seven cities in Pennsylvania with populations closely approaching 50,000, and a group of ten boroughs with populations approaching 15,000 were taken, the general death-rate for each was plotted for a period of six years and below this curve the sanitary index was plotted for the same period, based upon deaths from the diseases before-mentioned. (These charts were exhibited.)

As the sanitary index takes care practically of one third of the total number of deaths, it would be quite natural to expect that it would follow, in a general way, the curves of the crude death-rate from year to year.

The fact that it does not always do so, however, gives it a special significance, and would indicate that it has a distinct value of itself, having a tendency in certain localities to "peak" when the general death curve is comparatively flat, and to descend, at times, somewhat abruptly when the general death curve takes the opposite course.

The sanitary index does present, in rather a striking way, a composite picture of sanitary efficiency, and any state official who will take the trouble to plot such a curve for the municipalities in his particular state will be very apt to find graphic evidences of inefficiency of local health administration of which he may be morally confident, but which he is at some difficulty to demonstrate from general death-rates.

It is possible that the diseases included in the sanitary index here outlined, may be modified, or, on the other hand, extended; but the thought is presented for discussion, in the hope that some efforts may be made looking to a standard of this kind.

SHALL WE CLOSE THE SCHOOLS DURING EPIDEMICS?

FRANCIS GEORGE CURTIS, M. D.,
Newton, Mass.

Read before the Massachusetts Association of Boards of Health, December 11, 1913.

Among the traditional methods of dealing with an outbreak of communicable disease which have survived from the past, closing the schools when an epidemic appears seems to have lasted longest.

One cannot read in the daily papers the account of a so-called epidemic without seeing it stated that the board of health is taking vigorous steps to control the outbreak by closing the schools. Indeed, the public is so convinced that closing the schools is the necessary step to be taken in controlling an outbreak, that, if this is done, it rests assured that vigorous methods of control are in force and is satisfied, even if nothing more active is undertaken.

If, however, the health officer declines to close the schools he is blamed no matter how active he may be in checking the outbreak in other ways, and tremendous pressure is put upon him to compel him to close them. This pressure comes chiefly from the parents, but often, I am sorry to say, from the practising physicians, and a man must have a very rigid backbone to withstand it.

The statute provides that when a disease dangerous to the public health occurs the board of health shall use all possible care to prevent the spreading of infection; that is, the duty of the board is directed towards preserving the health of the public rather than towards the individual.

One factor necessary in checking an outbreak quickly is a knowledge of the cases at the earliest possible moment, in order to eliminate possible foci of infection by removing and isolating infected or suspicious cases, and the whole matter resolves itself into the answer to the question whether the board can best do this when the schools are open and the children under supervision or when the schools are closed and the children scattered?

It seems to be almost a truism to say that the best work can be done under the first set of conditions.

Another point which I fear is often overlooked is that, other things being equal, the work of the board should be done with as little disturbance of normal conditions as is compatible with efficiency. In other words, if the outbreak can be checked as quickly and efficiently without closing the schools as by closing them, the former alternative should be adopted.

The arguments in favor of closing the schools seem to be based chiefly

upon tradition and public demand and not upon careful study of the manner in which infection is transmitted in and out of the schools.

In the old days before much attention was paid to medical inspection of the school children and when incorrect ideas of the method of transmission of infection were held, the schools seemed to be very active means of spreading infection, and, indeed, at first glance, it may seem as if the schools were responsible for an increase in the incidence of the commoner communicable diseases of childhood. There is undoubtedly a rise in the curve of incidence of any of these diseases shortly after the opening of the schools in the autumn, and the natural inference is that the opening of the schools is the cause of this rise, but a little thought and a more careful study of the curve will show that this is not the fact.

During the vacation the majority of children of school age are not under such careful supervision as they are when the schools are open,—many of them are away from home and there is a larger number of missed and unreported cases. As soon as the schools are opened and the medical inspection begins, these cases are discovered by the school physicians and there is a rise in the number of cases reported.

Dr. John D'Ewart, assistant medical officer to the Manchester (England) Education Committee, claims that this rise is caused by the detection of many missed cases just after the schools open, and is really a rise in the number reported, and not a rise in the actual number of cases existing.

He shows that in Manchester during seventeen years, from 1893 to 1909, there was a rise in the number of cases of scarlet fever reported, beginning in September shortly after the schools open, reaching its maximum in the second week in October, and falling rapidly from October to the end of the school year, with a slight rise in the second week in January.*

He also shows that, taking the age at which children were attacked, there is a rapid rise in the curve of incidence up to seven years of age, followed by a steady fall from that age onward.

Children do not begin to attend school regularly until six years of age, so that the rapid rise in the curve of incidence shown during no school or irregular school attendance is stopped and converted into a fall after one year of regular school attendance.

If the schools were responsible for an increase in the incidence we should expect a great rise after the children enter school, say between the fifth and seventh years, whereas the figures do not show this expected rise, the percentages being 13.84 from 1 to 3 years, 28.71 from 3 to 5 years, 31.48 from 5 to 7 years and 24.53 from 7 to 9 years.

Taking the cases reported during the first fourteen years of life, 54.86

*¹¹The Medical Officer. London. Vol. VII, No. 9, p. 97ff.

per cent. occur during the first seven years and 45.13 during the second seven years.

In Newton, where the average age of entering the first grade is 6 years and 3 months the percentage of attack in scarlet fever during 20 years from 1893 to 1912 was as follows: 14.04 from 1 to 3 years, 25.56 from 3 to 5 years, 30.89 from 5 to 7 years and 27.80 from 7 to 9 years. For the first seven years of life the percentage of incidence was 52.01 and for the second seven years 47.98.

These figures seem to clear the schools from responsibility for any great increase in the rate of incidence of disease, for while the calculation is based upon scarlet fever alone it is equally true of diphtheria.

In two instances lately where the outbreaks were due to missed cases which were in the schools for some time before discovery, the first cases found were not children who sat near the infecting cases, nor were they in the same grade, but were those who were their playmates and companions out of school.

Thus, in an outbreak of scarlet fever due to a missed case, the first case reported was a child in another grade in the school, but living at the end of the same street with and a playmate of the infecting case; the second case was a child in another school, but living next door to the infecting case; the third, fourth and fifth cases, reported simultaneously, were a brother and sister of the infecting case and a playmate living across the street, none of them in the same grade. All of these cases, together with others, were traced to the infecting case, but of eleven cases due to this one, only two were in the same room at school.

More recently, in an outbreak of diphtheria, the cases were similarly infected, the majority being found among the children in other rooms than the one in which the infecting case sat, but all living near and playing with him out of school.

Of course no conclusions of any value can be drawn from so few instances; they are given for what they are worth in the hope that further observations by others may confirm or disprove them, but as far as they go they seem to show that infection is not contracted in the school room as frequently as is usually supposed.

If the schools are closed when an outbreak occurs, the children are turned loose from supervision; they mingle freely with one another in the streets, on playgrounds and in each other's houses. They are having an extra vacation and enjoying themselves thoroughly and are unwilling to admit that they feel ill, lest they be kept at home and prevented from having a good time. For this reason they will not say they feel ill until they are possibly well advanced and they may be active sources of infection for some time before it is discovered that they are ill.

In our experience in Newton, it has usually happened that cases among

children kept out of school by their parents from fear of infection during an outbreak are much further advanced and much more sick when found than are cases among children who have continued at school, and also that the outbreak has lasted longer among the former class than among the latter.

Dr. E. C. Levy, health officer of Richmond, Va., believes that during an outbreak of measles in 1910, the schools and Sunday schools were the chief means of spreading infection. In the outbreak of 1912-13, he tried the effect of closing the rooms in which a case appeared for five days, viz., from the ninth to the fourteenth day, after the detection of the first case. He thinks that this plan "would undoubtedly have lessened to some extent the spread of the disease" but it was soon apparent that such a course would result in the complete disorganization of the whole public school system.

It was, therefore, abandoned and whenever a case was discovered the teacher was instructed on what day to look for prodromal symptoms in others and that such cases should be immediately separated from the other children and examined by the school physician or nurse. In other words, after a careful trial, the closing of the schools was abandoned as impracticable.

If the schools are kept open and the children continue in the classrooms as usual, they are under strict observation and examined daily by the school physicians, suspicious and infected cases being sent home for observation or treatment.

In this way many children are sent home before they have had an opportunity to infect others, thus reducing the probability of spreading infection. Further than this, the attention of the parents is called to the fact that the child is feeling ill and he is brought under treatment earlier.

It seems, therefore, that keeping the schools open offers the best chance of safety for the scholars both collectively and individually.

Instead of closing the schools and allowing the children to be scattered and removed from supervision when an outbreak appears they should be kept open as usual and the children urged to attend. The school physician and nurse should be detailed to the school where the outbreak has appeared and instructed to examine every child daily, excluding such as appear ill or suspicious. This can be done with very little disturbance of the school work.

A note must be sent to the parent stating that the child seems, or is, ill and must be seen by the family physician.

Suspicious cases must be ordered to remain at home until further notice, and, if necessary, must be visited later in order to settle the diagnosis.

Absentees must be rounded up and examined in order to find out why they have been kept at home. If they are ill, they must be isolated, and, if well, urged to return to school.

Such a method of dealing with an outbreak may seem to entail a large amount of work and require a specialization, which the ordinary board of health cannot carry out, and it does entail more work than closing the schools and waiting for the outbreak to stop itself, but in reality it is not difficult.

In a large city the necessary force is at hand and ready to start work; in smaller cities the number of cases to be handled is small and will probably be confined to one school, and the school physician can be detailed to the affected school during the outbreak, leaving the other schools in his district to be covered by one of his colleagues.

Even if extra help should be required, a condition which will rarely occur, the extra expense incurred will be more than offset by the shortening of the duration of the outbreak and the lack of disturbance to the schools.

When the schools are closed certain expenses such as salaries, etc., continue without any return and there is also an added economic loss from the lessening of the time for instruction, so that the children in the affected school or schools are behind others in the same grade in the unaffected schools.

One practical difficulty which tends to lessen the value of keeping the schools open will be found in the fact that many children will be kept at home by their parents through ignorance of the facts or fear of infection.

This can be met by a frank explanation of the reasons governing the action of the board in keeping the schools open. In the writer's experience it has often happened that after a frank explanation of this sort to a disturbed parent the result has been that the enquirer has sent his children back to school the next day, being convinced that they were fully as safe there as when they were kept out.

In many Massachusetts cities the medical inspection of schools is under the control of the school committee and at first sight this would seem to complicate matters, but there is no real reason why it should.

As a rule the school committee is not at all anxious to have routine work of a school upset by closing, and is, therefore, very willing to keep it open and have the work continue. This being so it will require very little persuasion to induce the committee to keep the affected school open.

While somewhat beyond the scope of my subject I wish to say that in my opinion the medical inspection of schools is a very necessary part of the work of a board of health and should be under its control.

In conclusion, while it seems evident that keeping the schools open during an outbreak offers the best method of checking it quickly, it must not be thought that this alone is sufficient. There is plenty of other work to be done in looking for the cause of the outbreak, but the work in the schools counts for the most and is the most important.

DIRTY HANDS AND TYPHOID FEVER.

MARK W. RICHARDSON, M. D.,

Secretary of the Massachusetts State Board of Health.

Read before the Massachusetts Association of Boards of Health, December 11, 1913.

In the *Journal of the Royal Army Medical Corps* for June and July (1913) appears a most important article on the Causation and Prevention of Enteric Fever in Military Service, by Maj. S. L. Cummins, and the conclusion reached in this article, though written from a military standpoint, can, in most instances, be utilized equally well under the circumstances attending typhoid or enteric fever as it appears in civil life. I have selected a single phase of the subject as presented by Major Cummins, and that is the possible rôle of unclean hands in the spread of this disease. Major Cummins in his work made the following interesting series of experiments:

"The following technique was employed in all the experiments:

"The fingers were washed in a small quantity of sterile water in a sterile 'Petri' dish, or watch glass; the resulting dirty water was added, as a rule, to bile salt peptone water or else centrifugalized, and the deposit plated. The fingers, too, were passed over the surface of bile salt plates while still moist after washing. The media were then incubated and examined for *B. typhosus*.

"EXPERIMENT I—(July 26, 1909). Fingers of fecal carrier S. examined. Result: Negative.

"EXPERIMENT II—(November 2, 1909). Fingers of urinary carriers F. I. and S. examined (one hour after passing urine). Result: Carrier F. I., many colonies of *B. typhosus* both on 'direct' plates and from the bile salt peptone water. Carrier S., negative.

"EXPERIMENT III—(November 6, 1909). Two urinary and three fecal carriers were paraded without previous warning, and with no reference to the time since excreta had been voided. The fingers of all were examined as above. All were negative as regards *B. typhosus*. From fecal carrier L., however, a fair number of motile Gram-negative bacilli were isolated, giving the cultural reactions of *B. faecalis alkaligenes*. They were, however, agglutinated completely by a 1 in 100 dilution of antityphoid serum, and partially in dilutions up to 1 in 400. It may be added that the strain of *B. typhosus* from Carrier L. was very resistant to agglutination, only reacting completely up to 1 in 200 of the same antityphoid serum. Unfortunately, the culture kept for further examination was thrown away inadvertently when changing stations, and we were unable to go more

completely into the nature of the interesting organism isolated from the fingers of Carrier L.

"The series of experiments quoted serves to prove that *B. typhosus* itself, as well as other fecal organisms, can be isolated from the fingers of 'carriers,' a fact of great importance in connection with the contamination of food supplies. The following experiments show the effects of washing and removing the bacilli from infected fingers:

"EXPERIMENT IV—(September 26, 1912). To ascertain whether a finger infected with urine is easily sterilized. Dipped the tip of the right index finger in the urine of typhoid carrier A. (Proved to contain upwards of 3,000,000,000 per c.c.) (a) Rinsed in lysol solution (approximately 2 per cent.). (b) Then held the finger under the tap, rinsing first in cold, then in very hot water (temperature not recorded). (c) Washed very carefully in about 0.5 c.c. of sterile water in a watch glass, and plated the whole of the water used for this purpose. Result: Three hundred and thirteen colonies of *B. typhosus* on the plate. (d) After the washing in sterile water mentioned under (c), the tip of the finger was thoroughly soaked in absolute alcohol, allowed to dry, and the washing in sterile water repeated. The 'washings' were again 'plated.' Result: Four colonies of *B. typhosus*.

"EXPERIMENT V—(October 3, 1912). Contaminated the tip of left second finger with urine from Carrier A. (a) Allowed the finger to dry; (b) washed very thoroughly with soap and water under a running tap *Dried thoroughly with a cloth*. 'Washed' thoroughly with 0.5 c.c. of sterile water in a watch glass and plated the 'washings.' Result: No *B. typhosus* isolated. (c) Finally dipped the finger in lysol solution (2 per cent.), scrubbed, dried with a cloth, 'washed' as before and plated the 'washings.' Result: No *B. typhosus*.

"The first experiment shows that it may be very difficult to free a finger from contamination by *B. typhosus*. The second attempt was successful, possibly owing to the fact that the fingers were thoroughly dried with a cloth, the mechanical friction apparently helping to remove the bacteria. Even if this were the case, it only means that the cloth became infected, and the danger of contaminated fingers remains obvious."

In this connection, I will recall to your attention some experiments made by Mr. Henry N. Jones, bacteriologist of the State Board of Health, who has found *B. coli* on three out of twelve towels taken from a number of toilet rooms accessible to a considerable number of persons. Mr. Jones summarizes his results as follows: "A considerable portion of public roller towels become contaminated with human feces. An unknown number of human 'carriers' have typhoid bacilli in their feces. How many cases of typhoid fever are contracted through contact with soiled roller towels?"

Now, in 1913 (year ending December 1), 2,363 typhoid fever cases were

reported to the State Board of Health of Massachusetts. Inasmuch as it is estimated that 4 per cent. of typhoid fever patients become chronic carriers, it is evident that approximately ninety-five "carriers" were added in 1913 to those previously in existence. Moreover, it is stated that women exceed men as chronic carriers of typhoid infection in a proportion of five to one, a most significant fact when it is considered that women, far more than men, are concerned with the handling of our food supplies. Under the circumstances, the wonder would seem to be that we do not have a much larger amount of typhoid fever. If a single drop of urine can contain 3,000,000,000 typhoid bacilli, what can we think about the waiter's thumb which gets into our soup and the none-too-clean fingers of the farmer who milks the cows?

Now as regards typhoid carriers, there is no doubt, in my mind, that the urinary carrier is far more dangerous than the fecal carrier, for urinary infection is practically always constant, whereas fecal infection oftentimes is very markedly intermittent, and in this connection it is important to point out, as shown by Major Cummins, that the carrier condition may be much aggravated by a number of different factors, for instance, under conditions of rest and quiet, the bacilli in both feces and urine may drop to very moderate numbers. In the process, however, of extreme muscular work, such as is seen in a military campaign, the bacilli increase very markedly in number. Furthermore, it has been noted that treatment of typhoid carriers with specific typhoid vaccine increases temporarily to a great extent the number of bacilli excreted.

Another interesting feature pointed out by Major Cummins is the following, that severe diarrhoea will often bring to light typhoid bacilli in the feces of a carrier when they had been absent previously for long periods of time. Major Cummins explains this increase as caused by the rapid passage through the intestinal tract of the typhoid bacilli from the region of the gall bladder to the rectum. Because of this rapid passage, the typhoid bacilli escape a strong inhibitory action exerted ordinarily by the *B. coli communis*. Indeed, another experiment by Major Cummins shows apparently that *B. coli* has this strong antagonistic action on the typhoid bacillus. It was found, for instance, that the growth of the typhoid bacillus in unsterilized milk ceases in a short time because, apparently, of the presence in the milk of *B. coli*, whereas in sterilized milk the typhoid bacillus increases almost without cessation. This feature, of course, has a very important bearing upon the handling of pasteurized milk.

What can we do to eliminate this danger which we run constantly of typhoid infection through the uncleanly habits of typhoid carriers? As far as fecal carriers are concerned, all efforts at the present time have failed to discover any method of cure. Furthermore, urinary carriers, especially of the subacute and chronic type, are very slightly susceptible to curative

treatment. A few will yield to the administration of hexamethylenamine. I believe, however, that this drug used from a preventive standpoint, may be of great importance. I have recommended for a number of years that all cases of typhoid fever be given hexamethylenamine in doses of five to ten grains each, three times a day, throughout the course of the disease, and, with such treatment, I believe that the development of the carrier condition, as far as the urinary tract is concerned, may be prevented. I shall never forget the theatrical effect produced by this drug upon the infected urine, as observed during the acute course of the disease. A urine absolutely clouded with bacilli would become oftentimes perfectly clear within twenty-four hours. This, as I have said, is the favorable time for the exhibition of this drug, when the condition is simply that of bacteriuria and before any marked pathological changes have taken place in the mucous membrane of the urinary tract. By active efforts, then, in the direction thus indicated, I have no doubt that the number of urinary carriers in any community can be very distinctly cut down, and this reduction in the number of carriers can not fail to be of the greatest importance as regards the incidence of the disease.

What shall the health officer do when these chronic carriers have been discovered and when it has been demonstrated that no therapeutic measures remove the dangerous conditions? To be logical, typhoid carriers, be they of the fecal or urinary type, should be kept under the supervision and control of health officers as long as their dangerous properties are known to persist, but a period of quarantine which might necessitate individual restraint for a period covering forty or fifty years, is, of course, not to be thought of. In our pamphlet concerning the control of typhoid fever, the State Board of Health has been accustomed to recommend that no typhoid convalescent be discharged from observation "until two consecutive negative examinations have been made of the stools and urine. If the patient's business brings him in contact with food supplies, four consecutive negative examinations of the stools and urine should be required. In case a person is found to be, in spite of all treatment, a chronic carrier of typhoid bacilli, he should be kept under competent supervision by the local board of health; he should not be allowed to engage in occupations requiring the handling of foodstuffs and, in case he moves to another neighborhood, the local health authorities of that neighborhood should be notified at once."

It has been pointed out that to a certain extent, at least, the requirements just stated can be of comparatively little avail, because fecal carriers, being highly intermittent as regards the excretion of typhoid bacilli, can by no means be regarded as without danger, even in the presence of several negative cultures. It has been proposed, therefore, that such examinations be not required and that *every* typhoid convalescent be strongly impressed with the possible dangers he may inflict on others in his surroundings.

While I should be willing to accede to a certain extent to the arguments advanced above, at least as far as the fecal carriers are concerned, I believe that the examination of urine cannot, under any conditions, be given up. The urinary carrier, representing as he does a maximum of potential infection, and, moreover, infection which is likely to be constant for months or years, must without doubt become subject to a supervision infinitely more exacting than that necessary for a fecal carrier. I would, therefore, still require the examination of stools and urines of the convalescent, recognizing the fact that a negative report from the urine is of the greatest possible value, also recognizing, however, that a negative result from the stools is of practically no value.

Finally, as far as unclean hands are concerned, our course, as regards typhoid infection, would seem to resolve itself into the two following propositions: first, that inasmuch as no person can be absolutely certain that he is not a typhoid carrier (for, of course, it is well known that a healthy human being, and especially those attendant upon typhoid patients, may become a temporary typhoid carrier, even though he has not suffered from the disease itself) every one should, as far as possible, wash his hands with scrupulous care after any possible contamination with feces or urine, and, secondly, that no one should think of handling food, either for his own use, or for others, without carefully washing his hands.

NUISANCES UNDER THE LAW.

EUGENE WAMBAUGH, LL. D.,

Professor in the Law School of Harvard University.

Stenographic Report of an Address before the Massachusetts Association of Boards of Health,
December 11, 1913.

You have assigned to me a very wide subject, Nuisances under the Law. That subject includes a great deal more than the mere matter of public health. You are quite right in asking me to speak of the subject at large. That which has to do with public health peculiarly is understood by you much better than by me; and the reason for my speaking about the general subject of nuisances is merely that I may emphasize the relation of your branch of it to the whole matter.

There is one thing which will be demonstrated by what I say, namely, that the word "nuisance" has a somewhat indefinite meaning. Hence, I prefer not to deal with it in general language but rather to discuss concrete instances. That is the reason I have brought with me a few volumes of law reports. These reports contain examples of several nuisances and of the several sorts of procedure with which the courts handled them.

What I mean to do is simply to run through four simple typical cases. I dare say you are acquainted with all of them; but, nevertheless, let us run through them that we may ascertain in a very concrete fashion what a nuisance is and what the law does about it.

Let me begin with *Commonwealth v. Upton*, 6 Gray 473, away back in 1856. There a man had a slaughter house in Fitchburg. He had had it there for at least twenty years. He had had it there when the very neighborhood was a perfectly appropriate neighborhood for a slaughter house; but time had passed, streets had been built near his slaughter house, people had gone to live near it; and to his surprise at last he found himself indicted for having this slaughter house; and the indictment held, too. How horrified that man must have been! A slaughter house was a necessary thing, and very possibly it was conducted by him as well as it could be conducted. As far as most people know, such a thing is not peculiarly bad for the health, although it is probably disagreeable to smell, and possibly disagreeable to hear. Now, at last, this man was indicted. This man who certainly once was innocent, and who had been conducting this useful business for years and years, was now held to be guilty of a crime. Thus, we find from this little case that a man may be actually indicted and punished for a useful thing which he has done for a long, long time, which useful thing has, by and by, as time and place have changed, come to be what we

call for short, a nuisance—that is to say, it has become really an unbearable annoyance to the public.

The next case I will take is not as old as that. It is the case of *Davis v. Sawyer*, 133 Mass. 289, decided in 1882. There a gentleman had a factory and adjacent to his factory a tower and upon the tower a bell that weighed 2,000 pounds. With this bell he summoned his employees. He awakened them in the morning at 5 o'clock by ringing sometimes as many as 90 strokes, and between 6 and 6.30 he rang the bell several times again, and he kept up that habit more or less throughout the whole day. Now, there was another man in the neighborhood who lived in an ordinary residence 1,000 feet away, and this other man and the people in his home were awakened most disagreeably at the hour of 5 in the morning. Most of the people in the neighborhood, it would seem, really needed that warning at 5 o'clock. In a way they enjoyed it: that is to say, it was part of their mode of making their living, part of their mode of reaching at the right time the place where they were to be useful and get their wages in the long run; yet, against the ringing of this bell a court of chancery granted an injunction. That, then, is the second remedy. Here, too, we had a useful business prosecuted in a way, which, without doubt, at some time and in some place would be appropriate, or even laudable; and yet society intervened through the court which granted an injunction. That is the second of my little cases.

In each of the two cases thus far presented there was no statute law. The rule administered was simply good old-fashioned law as it had grown up at the hands of the courts through centuries.

The next case is that of *Rideout v. Knox*, 148 Mass. 368, decided in 1889. Here a gentleman built a high spite-fence. The public was in no way injured by the fence; but the neighbor against whom he built the fence was, of course, injured. There was and still is a statute to the effect that, if a person builds a fence more than six feet high for the mere purpose of annoying someone else, then his fence is a private nuisance. Now, the person who was injured in this instance simply brought an action for damages. He did not try for an injunction. He did not try for an indictment; and, indeed, he could not have got that, because this was not a public nuisance. He waited, and then he brought his action for damages. He recovered his damages. That is the third remedy, then, and a third sort of nuisance—to use the word that covers all these things and a great number of others.

Then we come to the last case which I mean to cite, and that is the case of *Stone v. Heath*, 179 Mass. 385, decided in 1901. Here the owner of property had upon his land a mass of decaying vegetable matter, which threatened a public water supply. By and by the board of health began to abate that nuisance. Here the shoe was, so to speak, on the other foot. The man who went to court this time was the man who was perpetrating the nuisance. He went to court and asked for an injunction against the

board of health. He did not succeed in his suit for an injunction, for he was told that under a statute the board of health had received power to abate such decaying vegetable matter as was really causing a detriment to the neighborhood. That case, then, calls attention to the fourth remedy, that is to say the remedy of abating a nuisance without the intervention of the court at all.

These last two cases are cases under statutes. In one instance the nuisance was made a nuisance by statute. In the other instance the nuisance was not made one by statute, for decaying vegetable matter in such a place had been deemed a nuisance always, and, besides, the power of abatement was not created by statute; but what was created by statute was the special privilege of the board of health.

We have now had instances of four remedies— to run over them again: First, the remedy by indictment, then the remedy by injunction, then the remedy by action for damages, and then, lastly, the remedy by abatement. These four remedies are given by society with reference to this somewhat hazy sort of a wrong, the nuisance.

And what a hazy sort of a wrong it is. The word "nuisance" means absolutely nothing but annoyance. How can you define "annoyance"?

What do you suppose those four wrong-doers in those four cases said? You know what they said quite as well as I do. The first man said, "Why, here is my slaughter house—*my* slaughter house; and society is interfering with my slaughter house." And the next man said, "Here is my bell which I enjoy ringing; and society is interfering with my bell." And the next man said, "Here is my spite-fence, and great satisfaction do I get out of it; and society is now interfering with it." And the last man said, I suppose, in one form or another, "Why, here are my dear, decaying vegetables; and society is interfering with them." Thus these four men, a sort of male quartet, sang four slightly different parts. And then the male quartet came out in unison and said, "You are interfering with the right of property, and that is a serious thing; and you are interfering with personal liberty, and that is still more serious." And when the male quartet concluded with their unison, society stood up and sang in chorus, "Yes, yes, we are interfering with the right of property, and that is a serious thing; and we are interfering with personal liberty, and that is still more serious. Yet the right of property and the right of liberty, odd as it may seem, were created by society for the purposes of society, are recognized and enforced by society for the purpose of the general welfare, and are restricted now and always in the light of that same purpose which caused the creation and the recognition of the right of property and the right of personal liberty." And then that male quartet would rise and say, "But how do you define this right of society to limit property and personal liberty?" And then society, speaking through the law,—for the law is

no more nor less than the voice of society; if you do not like the law, you must complain to society and not to the board of health—society says, in something like a chorus, "Why, there is a general principle underlying this restriction. It has two features. In the first place, society cannot complain unless a substantial damage is being done; and, in the second place, society cannot complain if the business is being carried on in a proper place and in a reasonable way." Then my male quartet will say, "What indefinite language this is! What is substantial damage? How do you draw the line as to the substantialness of the damage? Besides, what is a proper way for the carrying on of business? Where do you draw the line there?" And society will have to say, "We cannot draw a definite line for the present time, and still less can we draw a definite line for the future." And then my male quartet will say, "Oh, think of the danger and the injustice to us." Then society will say, "Gentlemen, we have hedged you about with the best protection that we know. It will lie finally in the opinion of twelve men of your neighborhood who have no peculiar interest in the matter; and even if there be not a case for a jury, for the reason that the case may be an injunction case in a court of chancery, even then you will have the protection of having these puzzling problems as to damage and reasonableness passed upon by a judge who is not interested in the matter, who is the mouthpiece, the responsible mouthpiece of the people of that same neighborhood at that same time. What more can society do for you four people protesting against these limitations that are placed upon your rights of liberty and of property? The limitations are not new in principle, although they may be new in application to your case. The procedure is not new. The machinery of the judge and jury, and also of the judge without a jury, must be conceded to have existed for centuries, and must be conceded to have taken care of matters even more important than these."

Sometimes it is worth while to stop for a moment and to think of the larger aspects of the homely work which we do day by day. You and I know, gentlemen, the disagreeable features of the work done by health officers. And yet, you and I know that the work is part of the necessary protection of society in its highest interests—its health and its morality—against the thoughtlessness, the unskilfulness and the selfishness of the individual. The work must be done. And society has provided sensible rules and has done its best to prevent them from being used oppressively.

But now my quartet will again complain, this time calling names; for my quartet must be admitted to be in the last ditch. My quartet will say, "Oh, this is socialism." No, it is not, and no good can come from calling it so, for if this be socialism, then socialism is as old as society and as old as those words of society which we call the law of nuisance.

This law of nuisance, by the way, is only one of at least four instances in which society has created and retained and developed powers which

enable the world, as time passes, to be a good fit. Men must live, and must live here and now, and must in the next generation live here, too. There must be rules to enable them to live comfortably and morally. There must be machinery whereby from time to time the need of today is met.

Now, there are at least four ways—and, indeed, there are more—in which the law, that is, society, without any revolution at all, does so limit property and liberty as to achieve the necessary welfare of the time. One of them is taxation, which takes from the citizen more and more as society needs more and more for the development of new institutions. Another is eminent domain, by which society, with compensation, to be sure, takes from the owner property which is dear to him and takes it simply because society needs it for higher purposes of its own. Another is the limiting of the callings affected with a public use; for society has always said, and today is still more emphatically saying, that there are some callings which are either so dangerous or so useful that society has the right and duty of regulating them. The law of nuisance simply takes its place as a fourth member of the small but powerful group of governmental powers absolutely essential for the development of man.

But my male quartet would like to ask one further question; and that is, "Where will this thing stop?" And I trust that the chorus of society will be truthful in this matter and will say, "We do not know."

And now, my friends, just as our predecessors have shown themselves worthy of being trusted with those four great powers, just as we of this generation have not gone to an unreasonable limit, so we may well believe that our successors will also bear in mind the same principles—principles which we did not create, but which we inherit—and that our successors will enforce wisely, with occasional mistakes, doubtless, those same doctrines. If we appreciate our own shortcomings, we think—indeed we know—that our successors will be as wise as we and that they will not go too far, and that they too will apply fairly to the needs of their place and time all the humanizing and civilizing powers which have existed so long, and, more specifically, the essential doctrines of this law of nuisance—the doctrines that a private individual may not use his property or his liberty in such a way as to do any substantial damage to his neighbors or to the whole community and that he must conduct his business, however useful it may be, in a way that is reasonable.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

A special meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Thursday, December 11, 1913, with President Samuel H. Durgin in the Chair.

The following gentlemen were elected to membership in the Association: Dr. Amzi Bedell Shoemaker, Board of Health, North Attleboro, Mass.; Mr. Francis J. O'Hare, Board of Health, Lowell, Mass.; Dr. E. A. Perrin, Board of Health, Stoughton, Mass.; Mr. John J. Rogers, Board of Health, Stoughton, Mass.

The following papers were then read:

"Nuisances," by Samuel H. Durgin, M. D., Boston, Mass.

"Nuisances under the Law," by Eugene Wambaugh, LL. D., Cambridge, Mass.

"Shall We Close Schools during Epidemics," by Francis George Curtis, M. D., West Newton, Mass.

"Dirty Hands and Typhoid Fever," by Mark W. Richardson, M. D., secretary of the Massachusetts State Board of Health.

It was moved that the chairman appoint a committee of three to recommend a set of regulations concerning absence from school caused by infectious diseases and the time for which those who have been exposed at home or otherwise shall be under observation.

The motion was seconded and carried.

The Chair announced the appointment of the following committees: Committee of Nominations—Dr. Mark W. Richardson, Dr. L. A. Wood, Mr. Wm. L. Underwood, Mr. R. L. Newcomb, Dr. F. M. Kennedy, Dr. Henry J. Barnes, and Doctor Tobin. Committee of Isolation of Contagious Diseases—Dr. W. J. Gallivan, Professor Howe and Dr. Francis George Curtis.

There being no further business the meeting then adjourned.

BOOK REVIEWS.

Bovine Tuberculosis and its Control. By *Veranus Alva Moore, B. S., M. D., V. M. D., Professor of Comparative Pathology, Bacteriology, and Meat Inspection, New York State Veterinary College at Cornell University, and Director of the College.* Price \$2. 134 pages. 30 full-page illustrations. Carpenter & Co., Ithaca, N. Y., 1913.

Professor Moore, in this book addresses those that find it necessary to be informed as to the essentials of his subject rather than those who are expert in this direction.

The opening chapter is a brief history of tuberculosis in cattle; it is followed by a statement of the economic and sanitary importance of the disease. In Chapter 3, bacterium tuberculosis is described and there are some remarks on the difference between the human and the bovine germ and on acid fast organisms. The nature of tuberculosis is explained and the tissue changes wrought by the disease are described in Chapter 4. This is followed by a chapter on the symptoms of tuberculosis in cattle. Methods of dissemination are discussed in Chapter 6, which is one of the longest in the book and contains valuable information. Diagnosis by microscopic examination, animal inoculation, and tuberculin are briefly touched on in Chapter 7. Chapter 8, on tuberculin and its use, is excellent. Detecting tuberculin in cattle by physical examination is the subject of Chapter 9, and an account of the attempts to immunize cattle against tuberculosis is given.

Then the control of tuberculosis is discussed. The methods adopted in the United States, Denmark, England, Germany and Holland are set forth, and the Bang, the Manchester and the Ostertag methods of freeing herds from tuberculosis are explained. It is pointed out that in all the countries mentioned, save the United States, dairymen are permitted to sell milk, except for infants, from tuberculin reacting cows that do not show recognizable physical symptoms of tuberculosis; and the question is raised whether this does not encourage dairymen to rid their herds of the disease more than do the methods in vogue in our own country. The chapter closes with some remarks on disinfectants, and on the necessity of a state meat inspection in connection with the control of tuberculosis.

In the appendix is given the valuable report of the International Commission on the Control of Bovine Tuberculosis. There are twenty-nine full-page half tones that, for the most part, depict diseased organs, and there is a bibliography of four pages.

Horatio N. Parker.

Disease in Milk—The Remedy—Pasteurization. By *Lena Guther Straus.* 221 pages. Paper cover. New York, 1913.

In this brochure Mrs. Straus gives the public an account of her husband's efforts to reduce sickness and death amongst infants by making pasteurized milk available to the poor. This laudable undertaking was beset with difficulties, for it not only required much money, but entailed the exercise of tact and patience in satisfactorily answering criticism of a new food to the end that it might be widely used and thereby accomplish the desired result. Everyone interested in child welfare work and in the solution of the milk problem knows in a general way of the work

of Nathan Straus, but few are aware that his time and means were as generously employed as this book shows.

In 1892 Straus became convinced that impure milk was responsible for the deaths of many babies; so in 1893 he began the distribution of pasteurized milk, putting out 34,400 bottles during the year. By 1906 the number had increased to 3,140,252; in fact, the gospel of pasteurization spread steadily through Straus' charities. At one time or another he supplied pasteurizing plants in Brooklyn, the infants' asylum on Randall

Island, Philadelphia, Chicago, Washington, Wilkesbarre, Toronto, Dublin, Karlsruhe, Manila and elsewhere.

Besides an account of these things, there are to be found in Mrs. Straus' publication a description of the way milk is pasteurized at the Nathan Straus Pasteurized Milk Lab-

oratories in New York, and formulas that are used in modifying milk there, together with many letters and addresses of Mr. Straus on the relation of milk to the public health. A number of illustrations enliven the book which should encourage others to undertake similar work.
Horatio N. Parker.

Eugenics in the United States. (*Die Rassenhygiene in den Vereinigten Staaten.*) By Geza von Hoffmann, Austrian vice-consul. 150 pages with classified bibliography of 85 pages in addition. Munich, J. F. Lehmanns, 1913. \$1.50.

This is one of the most interesting books on eugenics that I have seen, and is a monument to thoroughness. Almost the only fault one can find with it is that it was not written in English. There certainly should be sufficient demand for a translation. The American eugenicist, who knows how often "the eugenic marriage" is ridiculed in our newspapers, will doubtless feel that Herr von Hoffmann sees eugenics in America through rose-colored spectacles; but it is well to look at the bright side as well, as the dark, and it is always broadening to see ourselves as others see us.

The contents of this encyclopedic work are as follows: I, Elements of Eugenics. II, Diffusion of Eugenic Ideas in the United States. III, The Regulation of Marriage in the Eugenic Sense. IV, The Sterilization of the Inferior. V, Selection of Immigrants. Appendix I, The Wording of the Michigan Marriage Law. Appendix II, Wording of the Sterilization Laws. Appendix III, Wording of the Immigration Law. Appendix IV, Bibliography. General index.

The author makes the surprising statement in his introduction that "the man who in America is considered feeble-minded, undesirable, and fit for an institution, is regarded by us as only a stupid fellow," and accordingly one does not find in European institutions the same class of feeble-minded persons

that is confined in the American. From my short experience of three years in Germany I think the standard of normal mentality is higher in America than in Germany. Von Hoffmann expresses his faith in the future of eugenics in America in the optimistic words: "Galton's dream that eugenics will become the religion of the future is finding realization in America." May his prophecy come true!

The chapter following gives a most encouraging summary of modern eugenic activities in America, beginning with Wilson's presidential address and ending with a full statement of the origin and aims of *The Eugenics Record Office at Cold Spring Harbor, Long Island, New York*, which, together with the Station for Experimental Evolution of the Carnegie Institute, may be considered the headquarters of scientific work in eugenics for the United States. For a list of their bulletins, memoirs, and family record blanks address the director, Prof. C. B. Davenport.

The two chapters on the regulation of marriage and the sterilization of the inferior consider all the advantages and objections so thoroughly and impartially, citing numerous authorities, that they seem to be the last word on the subject and deserve the widest possible reading. The reader is left to draw his own conclusions.

William L. Holt, M. D.

Manual of Bacteriology. By Robert Muir, M. D., Sc. D., F. R. S., Professor of Pathology, University of Glasgow; and James Ritchie, M. A., M. D., F. R. C. P. (Ed.), Superintendent of the Royal College of Physicians' Laboratory, Edinburgh, formerly Professor of Pathology in the University of Oxford. Sixth Edition. 192 illustrations and 6 colored plates. 736 pages. \$3.25. Macmillan Co., 66 Fifth Avenue, New York, 1913.

The first addition of this well-known Manual of Bacteriology appeared sixteen years

ago. It has deservedly reached its sixth edition and in its present form represents a re-

vision of the entire work. Notable additions are a section on the bacteriology of milk in Chapter V, and a well written chapter on the pathogenic fungi, to which Professor Percy Groom of the Imperial College of Science, London, has contributed. The authors have increased the number of well chosen photographs in the text, but advantage has not

been taken of the new edition to replace a few of the rather poor line drawings of bacteriological apparatus in the chapter devoted to general bacteriological methods. It is difficult to make any criticisms of this excellent manual, which will continue to be indispensable to both physician and laboratory worker.

M. F. Boyd, M. D.

Marriage and Genetics. *Laws of Human Breeding and Applied Eugenics.* By Charles A. L. Reed, M. D., F. C. S. 182 pages. Price, including postage, \$1. The Galton Press, Publishers, Cincinnati, Ohio.

The aim of this book, we read in author's preface, is to expound in popular terms the laws of human breeding and to indicate the manner of their application, first, for race improvement, and second, for the protection of person and progeny from the sequels of "social disease."

Division I, sixty pages, is devoted to what the author terms the decalogue of human breeding. This consists of a restatement of some of the great generalizations in the fields of heredity and evolution associated with the names of Weissman, Hæckel, Galton, Mendel, Spencer, and Darwin, together with a statement of the inverse relation of growth and reproductive power, and two or three "laws" for which no reference is given. In Division II, thirty pages, we find a discussion of the "social diseases." In the final six pages of Division III, a possible *modus operandi* of a prenuptial eugenic examination is suggested. The remainder of the book, fifty-five pages, save the conclusion, contains a list of "genetic factors," including first, unit characters which have been demonstrated to be of Mendelian significance in man, and second, malformations and diseases which may interfere with procreation or figure in inheritance. Examples of the alphabetically arranged factors are alcoholism, literary aptitude, mumps, music, myopia, temperament, tuberculosis, tumors.

The book is evidently written with sincere enthusiasm and is an interesting example of the widespread modern tendency towards untechnical presentation of scientific subjects, particularly the science of inheritance.

However, it seems to the reviewer that two

serious criticisms may be justly held with regard to Doctor Reed's book and many others of its class. The first is in regard to the possibility, in so limited a space, of presenting the greater part of the subject of inheritance without likelihood of many misinterpretations on the part of non-critical laymen. Furthermore, our confidence is not increased by certain apparent lapses, such as the confusion of the fact of the continuity of life through cell lineage (first clearly appreciated by Virchow) with Weissman's theory of the continuity of the germ plasm, two entirely different matters. Moreover, the theory of the continuity of the germ plasm seems to be regarded as a fact universally demonstrated. Again, the author says, "The laws governing the determination of sex are unknown." Again we read of "lowly but important organisms, a million of which, ranged in a single file, measure less than an inch." Again, the gonococcus is spoken of as "a minute organism consisting of two spherical halves."

The second criticism refers to the failure of the author to point clearly to the present embryonic state of eugenics. In only a few inconspicuous separate paragraphs is the limited amount of data available for eugenic generalizations mentioned. There is a great abundance of dogmatic statement of "laws" of nature with various implications as to their immutability, but little reference to their possible debatability. Consequently, one must ask himself if the lay reader might not either be easily misled by the apparent straightness and obviousness of the road of race culture, bounded by so many fences and

guide posts, or mystified at the small amount of progress that, when all is said, seems actually to be taking place thereon.

This leads to the general question of the wisdom of premature popularization—of rushing in where Pearson fears to tread.

The portions of the book dealing with

strictly medical subjects are presumably sound—are certainly interesting, though brief. The reviewer would like to add his objection to that of others against calling gonorrhœa and syphilis "social diseases."

E. C. Howe, Department of Hygiene, Wellesley College.

Mouth and Mouth Sepsis. By John S. Martshall, M. D. Philadelphia, Lippincott. 1912. 8vo., 262 pages.

As indicated in the title, this book treats, first, of the proper care of the teeth under the varying circumstances of temporary and permanent dentition, illness, etc.; and second, of the many diseases, near or remote from the seat of infection, originating in or affected by oral sepsis. The two subjects are treated at about equal length.

Everyone must welcome any forcible argument for increased attention to oral hygiene. School teachers and sanitarians, for whom, among others, the author says the book is intended, should read here with interest and profit. As a member of both classes, however, the reviewer must take exception to certain parts and methods of the argument. Guarded, balanced statement, possibly even understatement, adds far more to the force of an argument than alarmism and careless sanitary science. It could be wished, for example, in view of the accepted facts of the amount of air-borne infection, that less lurid pictures had been painted of the "poisoning of the air. . . by every expiration. . . with the organisms of pulmonary tuberculosis, bronchitis, la grippe, and numerous others." To ptomaines is ascribed, in several instances, the responsibility for intestinal disease—a loose practice which doubtless rests on some limited basis of fact, but which

should be discontinued and discountenanced till that basis is clearly understood. The positive, unqualified statement that opsonic index is the measure of vital resistance would seem to be taking much for granted. The reviewer, from the standpoint of a teacher, would rather see the statistics proving that dental disease, unlike almost all others, is on the increase, than believe the bare statement to that effect; and he cannot rest satisfied with the inadequate reference to the relation of dental disease to heredity. The phrase "mycotic disease" is used where *microbic* must be meant. The advocacy of sterilization of the tooth brush after using in the home is of questionable expediency from the propagandist's standpoint, and of doubtful necessity from that of the bacteriologist. The constantly recurring use of special terms in pairs—their scientific and common forms always coupled—is of doubtful usefulness in a book of this kind, since neither expert nor layman needs the technical synonym. It increases the length of the book, and does not always lead to clarity, *e. g.*, "pyorrhœoalveolaris—Rigg's disease." It easily leads to actual redundancy, as "the food is ground, triturated" and "indigent, poor."

E. C. Howe, Department of Hygiene, Wellesley College.

Report of the Sex Education Section of the Fourth International Congress on School Hygiene and of the International Meeting of the Federation at Buffalo, New York, August 27 and 29, 1913. Issued by The American Federation for Sex Hygiene. Tilden Building, 105 West 40th Street, New York City, 1913.

"Order out of chaos" is the keynote of a little book, published by the American Federation for Sex Hygiene, containing the proceedings of the Sex Education Sessions of the

Fourth International Congress on Sex Hygiene and of the Annual Meeting of the Federation, held at Buffalo, N. Y., August 27 and 29, 1913. One feels, indeed, after such stim-

ulating papers and the keen, searching discussions which followed, that the mists of over-enthusiasm and misdirected energy are fast disappearing before a calmer and more judicious appreciation of the far-reaching complexity of the whole problem. As Mr. Birtwell, a recent officer in the federation, remarked: "The best thing for this cause the country over is a very fundamental recognition of the fact that we are groping; we are only on the threshold of the subject, and we had better beware of resolutions."

Special emphasis was laid throughout the meeting on the questions concerning school instruction. In what grades, at what ages, by whom, and how were the questions which received the greatest discussion. These, and many others, in drawing out the judgments and experience of those who have actually been teaching sex hygiene in the schools, are of material aid in clarifying one's own opinions. For a subject requiring such careful analysis, and in which the temptation to decide everything at once is so great, the words

of Dr. Ira S. Wile are very encouraging: "We are not going to decide this year or next, and if we begin to assert dogmatically that this is the time, and this is the age, and this is the place, we are going to wreck the whole movement before it advances any further."

Among the seven papers contributed are: Public Opinion and Sex Hygiene, by Dr. Charles W. Eliot; Points of Attack in Sex Education, by Dr. T. M. Balliet; Education *v.* Punishment as a Remedy for Social Evils, by Dr. Hugh Cabot; and Some Methods of Teaching Sex Hygiene, by Miss Laura B. Garrett.

The publication of the proceedings of these meetings in book form must be warmly welcomed as offering the public a better opportunity of learning how earnestly the American Federation of Sex Hygiene is attacking its problems, as in the past its proceedings have appeared only in the closed and limited circulation of its quarterly magazine.

P. S. Platt.

HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS.

Cambridge, Massachusetts.

The annual report of the Board of Health of Cambridge for the year 1912 presents in a brief, but well chosen form, the work which has been accomplished. Although geographically a part of Boston, Cambridge is incorporated separately and has a population of about 108,000. The total number of deaths, excluding stillbirths and deaths of non-residents, but including deaths of residents which occurred outside the city, is 1,519, making a corrected death-rate of 14.05, the lowest on record. Two hundred ninety-four deaths, or about one-fifth of the total number, occurred under the age of one year, but since there is no report of births given, the rate per thousand births is not available. The expenses of the board other than the cost of maintenance of hospitals is about twenty-eight cents per capita population, but this does not include scavenging, which is carried on by another department.

The rate of incidence of contagious disease is higher than normal, due to an epidemic of measles which brought the total number of cases of this disease for the year up to 1,015. Fifty-five cases of typhoid were reported during the year, the lowest number on record. Diphtheria and scarlet fever cases are also well below the average number for the ten years recorded.

The report of the bacteriological laboratory shows a total of 2,523 specimens exam-

ined, all but nine being for either diphtheria, typhoid, or tuberculosis. The inspector of milk and vinegar reports the bacteriological or chemical examination of 656 samples. Of 606 samples of milk examined 50 per cent. showed more than 500,000 bacteria per cubic centimeter, high counts being largely due to improper refrigeration and careless handling in the shops rather than to bad conditions of production. During three months of the summer five stations were made by the board for the purpose of dispensing modified milk for infants.

School inspection is being carried on with good results, although the small number of physicians and nurses has been a handicap. A Fresh Air School for special cases of anemia, and so forth, has also proved of great value.

Other reports in the book are of the diphtheria hospital, the tuberculosis hospital, and the inspector of provisions. The recommendations of the board in regard to improvements needed include the employment of additional school nurses, additions to the present system of public comfort stations, legislation for better control of the milk supply, and the extension of the system for supplying modified milk for infants. It is possible that the sanitary survey of the city which was launched during 1913 will result in pointing out other possibilities for improvement.

Edmonton, Alberta.

The conditions existing in Edmonton make it extremely difficult to carry on public health work which will show definite returns. Situated in a relatively new country and in such a position that it is a focus for travel and has a large floating population during the summer months, there is bound to be a high contagious disease rate due to imported cases.

Added to this, a considerable portion of the population is foreign, and these are mainly ignorant of the most elementary points of sanitation; so not only is it a favorable ground for the spread of disease, but also the reporting and isolation of cases becomes very difficult. In his report for the year ending October 31, 1912, Dr. T. H. Whitelaw, the

medical officer of health, tells how successfully and actively the health department has waged its campaign.

The difficulty of obtaining full reports of deaths, births, and sickness probably makes the vital statistics a little uncertain. The death-rate is not stated in the report, but using the estimated population of 60,000 it appears to be 8.45 per thousand. The highest single cause of death was infantile diarrhoea, which makes up nearly 10 per cent. of all deaths and gives a rate of 53 per thousand births. The majority of deaths from this cause was among the foreign population, and in two-thirds of the cases the baby was being fed on cow's milk from private cows, of which there are a large number in the city. The total contagious-disease rate is high; typhoid showing the especially bad figure of 407, though 143 cases would not be considered, since they were brought into the city from the outside. An epidemic of measles helped in making a total of 1,138 cases for the year, the epidemic being slow to come under control. The medical inspector of schools proved to be of great help in locating cases which otherwise might have proved a source of danger. The value of the work in the schools was also shown by the incidence of smallpox, which for the lower age periods came wholly from a newly annexed section

of the city, in which vaccination had not been enforced in the schools. The whole contagious disease situation was complicated by the burning of the isolation hospital early in the year.

The rapid growth of the city has made the work of scavenging very difficult by reason of the large amount of debris accumulating from building operations and the fact that the unpaved streets often become impassable. The extension of sewer and water service has not been able to keep up with the requirements and this adds another source of danger to health. The city's milk supply is in good condition aside from the number of private cows, which are always a possible menace. The milk inspector has no facilities for laboratory examinations, but has apparently accomplished good results by frequent inspection and by educational work.

The detailed reports of the milk, food, sanitary, and health inspectors, and of the engineer, are, in general, well prepared and indicative of active and intelligent work. The total expenses of the department amounted to about \$1.33 per capita population, but of this amount only 50 cents was spent by the health officer proper, the remainder going for incineration, scavenging and the support of the isolation hospital.

Savannah, Georgia.

The annual report of the Department of Public Health of Savannah for the year 1912 almost marks the completion of twenty-five years of continuous service by Dr. W. F. Branner as health officer and secretary of the board of health. Coming from a position in the United States Public Health Service, he entered the employ of the city of Savannah in April, 1888, and has done much toward giving the city a model health department.

Efficient public health administration finds a great obstacle in the fact that of the total population of 77,000 about 41,000 are colored. Of the colored inhabitants many are negroes of unmixed descent and Doctor Branner finds that they have not yet become able to thrive in cities, since they are not

over 200 years removed from the African jungle. Evidence of this is shown in the death-rate which is 15.09 for whites and 27. for negroes (total rate 21.43). The deaths from tuberculosis and pneumonia are, respectively, as follows:—white, 41 and 27; negroes 130 and 111. The imperfect registration of births doubtless exaggerates the rate of deaths under one year per thousand births, but this appears to be 98 for whites and 183 for negroes. More important than the fact that the negro deaths bring up the total rates is the fact that the rate of incidence of contagious disease is proportionally high among the negroes, due to their general disregard of sanitation as well as to their greater susceptibility, and consequently their presence in the city makes a constant source

of disease among the whites so that the white rate also is abnormally high.

Among the various reports of special activities that of Doctor V. H. Bassett, the bacteriologist, is noteworthy. The value of the laboratory equipment is estimated at \$12,000 and with the aid of two assistants a total of 8,250 examinations was made during the year. These included examinations of pathological specimens for bacteria or animal parasites and also 6,169 bacteriological or chemical analyses of milk, cream and ice

cream. By this means a close and beneficial control is exercised over the milk supply.

No report of the cost of maintenance of the department is to be found, and in general the tabular reports are insufficient except, perhaps, in the case of the laboratory. The most glaring defect in this line is the system of classification of deaths which is arranged alphabetically and contains such classically inaccurate and undesirable terms as anemia, convulsions, dropsy, and marasmus.

Springfield, Massachusetts.

The Board of Health of Springfield presents its annual report for the year ending December 31, 1912. The report covers nearly 60 pages and is neatly bound and carefully prepared, so that it is a credit to the city in itself in addition to indicating active and progressive work on the part of the board.

Perhaps the best part of it, from the standpoint of the casual reader, is the introductory discussion of the relation between the city health department and the individual. It appears that in Springfield this relation is, on the whole, quite ideal, since the public is not merely in a receptive mood, but often actively coöperative. Taking this as a text the report says in part:—"The prevention of disease and the establishment of increased resistance to infection are great educational problems, in which the health department should act as a leader and director, but in the final outcome an equal or even greater responsibility rests upon the individual. Carelessness, ignorance, or willfulness on the part of the individual are features beyond the control of health regulations or police supervision." . . . "The individual must be made to see and feel that he also has a duty to perform in improving the health of the community, and that it will in the aggregate make a great difference whether each one does his share or not. If we are to have a clean and healthy city it must come through the coöperation and help of the public at large. The careless must become careful,

the willful must be restrained and the ignorant be taught and educated to appreciate the value of sanitary methods of living."

Springfield has an estimated population of 96,973, a corrected death-rate of 12.8, the lowest on record. The birth-rate was 29.9 and the infant mortality 9.7 per thousand births. The contagious disease rate is fairly low, measles leading with 598 cases but scarlet fever and diphtheria showing a decrease from previous years.

Several pages are devoted to a report on the milk supply and milk inspection. The board maintains an active control over the milk supply by means of frequent inspections and collection of samples for analysis and has succeeded in establishing very good conditions. No dip tanks are used in shops in the city and many of the restaurants are serving milk in bottles. Educational work among the producers and the score card is being used with good results. Of 405 samples examined bacteriologically during June, July and August 71.4 per cent. showed less than 100,000 bacteria per cc.

Detailed reports of the health department hospital (as the isolation hospital is now called), of the laboratory, of the medical inspection of schools and the inspector of provisions show correspondingly good and efficient work. The cost of the work of the board of health, other than the maintenance of the hospital, amounts to 17 cents per capita. This does not include scavenging.

DEPARTMENT NOTES.

Pure Milk Contest.

The *Municipal Bulletin* of Tacoma, Wash., in the issue of December 20 tells of the results of a market milk contest held as a part of their recent Home Products Exposition. Cups were offered for those making high scores but the dairymen did not know that samples were being taken until 80 per cent. had been collected. The basis of scoring is quoted below and, from the fact that four dairies scored over 75, it will be seen that at least a part of Tacoma's supply is in excellent condition.

"As a basis upon which a perfect score of 100 per cent. could be made the judges used the standard score card published by the Federal bureau of animal industry. Thirty-five points were allowed on bacteria when not more than 400 bacteria per cubic centimeter were found. When the count exceeded 200,000 per cubic centimeter no score was given, and the entire 35 points lost. For flavor and odor 25 points were awarded. Due to the fact that milk is very susceptible to bad odors with which it might come in contact, and the possible presence in the milk of undesirable bacteria from the feeding of bad food to cattle, thus influencing the flavor, great care was exercised by the judges in testing samples on this division of the award.

"The presence of dirt in the milk samples resulted in deductions of 10 points. Milk having 4 per cent. or more of butter fat was given a perfect score of 10. Milk averaging less than 2.7 per cent. was given a zero score. Another 10 points were credited to samples having 8.7 per cent. of solids not fat, while those having less than 7.8 per cent. were given no score. Five points were given for acidity, samples having .2 per cent. and less getting 5 points, while those having more than .24 per cent. were given none.

"For general appearance of bottle and cap (all market milk is now sold in bottles), 5 points were given if the average was high. Caps leaving depressions on the top of bottles where dust might collect and mire with milk oozing out around the edges were given no score."

City Laboratories as Training Schools.

Similar to, if not patterning after, the Boston Board of Health Laboratory in its coöperation with the new Boston School for Health Officers is the innovation recently introduced in Buffalo and reported in the following clipping from the *Buffalo Sanitary Bulletin*:

"Respecting the numerous applications received from time to time from younger practitioners of medicine, arrangements have been completed whereby the laboratory of the Buffalo Department of Health will receive two student assistants, who are graduates in medicine not longer than a period of five years, the age limit being not greater than thirty-two years.

"This laboratory instruction can be classed as an internship, the recipient not receiving any other compensation other than the experience obtained.

"Persons applying for same must agree to remain at least six months and devote not less than three hours each day in the laboratory. This affords a most valuable opportunity to become familiar with the work in a health department laboratory.

"Application to enter same must be made in writing to the Health Commissioner. Applications will be received any time after January 1, 1914."

No doubt the same plan might be tried with good results in other cities.

Permanent Public Health Exhibit.

"On Wednesday, December 17, a permanent exhibit, showing the various activities of the department of health, was opened in the Exhibition Hall on the fifth floor of the department building, 149 Centre Street. On this occasion, Dr. Stephen Smith, one of the original organizers of the present department of health, delivered an interesting address describing sanitary conditions in New York City fifty years ago. At that time the death-rate was over 36 per thousand, almost treble the present rate. The health authorities had no real power to remedy matters and the work was, moreover, largely

dominated by politics. Dr. Stephen Smith was one of the prime movers in the formation of a citizens' committee, which made a very extensive and searching investigation into the sanitary condition of the city and prepared a bill which was finally enacted into law, reorganizing the department of health in its present form.

"Doctor Jacobi, another of the speakers, emphasized the enormous improvement which had taken place in the milk supply of the city and heartily endorsed the attitude of the department of health in the matter of the pasteurization of the milk supply.

"Prof. Charles F. Chandler, who was one of the first 'Pure Food' chemists in this country, gave an interesting account of the examination of foods for adulterations and emphasized the distinction between those which were dangerous to the public health and such as were merely commercial frauds but without effect on the public health.

"The retiring general medical officer of the department of health, Dr. Hermann M. Biggs, sketched the remarkable changes which had taken place in public health methods following the bacteriological discoveries of Pasteur and Koch in the seventies and eighties.

"It is planned to make the exhibit permanent and keep it up to date and make it available to students of public health and others desiring to acquaint themselves with the work of this department."

Weekly Bulletin of the New York City Department of Health, January 3.

Rat War in Tacoma.

Not to be outdone by Seattle, Tacoma is following the lead of other coast cities in investigating the rat situation there with a view to avoiding the possibility of bubonic plague. The following clipping from the *Municipal Bulletin* tells of the plans for the work:

"With the sanction of the city council the Department of Health and Sanitation has taken up the fight on the rodent. It is to be a war of extermination, not to be waged intermittently, but consistently, and the threatened danger of bubonic plague which government health experts say is

imminent at the present time will be done away with.

"The plans of the health department call for an examination of every rat caught. Two men have been assigned to the work and they will set traps at different vantage points along the water front and around the sewer openings. The bodies of the captured prey will be taken to the health office and after first being placed in a strong solution of lime to kill the fleas, the inspection will be made to see if the rodent is infected with bubonic plague.

"A large number of plague-infected rats have recently been caught in Seattle, and it is the return of plague indications that has aroused the other cities on the coast to take similar preventive measures."

Requisites for Vital Statistics.

The January number of *Florida Health Notes* contains a plea for better vital statistics in the state and some directions for the local registrars. The requisites are well compiled and should find more than a local field of application. The directions are as follows:

Should be Complete.

Every birth and every death should be reported by some one having knowledge of the facts, preferably a physician. Unless 90 per cent. are reported, the returns are of little use and are often misleading. Registrars cannot expect payment if reports do not reach such degree of accuracy.

Should be Prompt.

The necessary information regarding deaths and births is often quickly forgotten and the persons having such information lost sight of, so promptness is the essence of good reports. Certificates should be filed immediately after a birth or a death. And registrars should send their monthly reports to the State Board of Health promptly.

Should be Accurate.

Every question should be answered and every blank filled out; if the information is not obtainable, the omission should be explained by the words, "Unobtainable" or "Unknown." Many of the questions may seem unnecessary and unreasonable, but each

has been carefully considered by experts, and all are needed either for legal record or medical statistics.

Should be Legible and Permanent.

All certificates, either of birth or death, should be legibly written (or typewritten) in unfading ink. This is a necessary protection that these invaluable records may be permanently preserved for future reference. Otherwise they would be undecipherable and in a short time fade and lose their value as legal or other evidence.

Should Have Proper Cause of Death.

Physicians should be careful in assigning cause of death, that deaths may be properly compiled and tabulated, and registrars should return certificates for correction when needed before sending them to the State Board of Health. When no physician attended decedent, the health officer, or the coroner in any suspicious case, and the registrar only in their absence, should sign the death certificate.

Should be Preserved and in Order.

Registrars should make copies in their record books for local record and should number each certificate consecutively, beginning a new series the first of each year for both births and deaths in new books. This will insure each community an orderly reference, while the originals will be safely kept and carefully indexed at the State Board of Health where certified copies can be obtained upon request.

Should Have the Support of the Public.

Every citizen of the state should loyally support this work, and see that every birth and death is reported to the registrar if it occurred in a city of 2,000 population or over, otherwise to the State Board of Health direct. If every one does his part there will be no question as to necessary 90 per cent. of all births and deaths being reported and Florida will soon be in the registration area and have her mortality reports published by the Census Office as an authoritative statement of her healthfulness.

Scarlet Fever, Measles and Whooping-Cough.

During the month of December the Virginia Department of Health issued special

bulletins on scarlet fever, measles, and whooping-cough. Each bulletin takes up one disease, telling of its cause, mode of transmission, effect, prevention, and treatment. We quote below the suggestions given for preventing the spread of whooping-cough:

"1. Notify all the friends of the family that your child has whooping-cough.

"2. Instruct the nurse, or whoever is in charge of the child, not to mingle with other children or to go near any children in any home, park or public place.

"3. Until the cough has entirely disappeared, keep the child from Sunday School and from day school, from the street cars, from stores and from all contact with children.

"4. If the child is by accident in the company of other children and has a coughing spell, cover his mouth and nose with a paper napkin or handkerchief and burn this as soon as possible.

"5. Do to other mothers' children as you would that those children's mothers would do unto you."

The rules for measles follow:

"1. Keep children, particularly those under five, who have not had measles, away from Sunday School or any public place where children congregate during the measles epidemic.

"2. During a measles epidemic let your children play only with children who have had measles.

"3. If your children have been exposed to measles keep those who have not already had it away from other children during the period of from eight to fourteen days after exposure.

"Children who have had measles seldom or never carry it.

"The child to watch is the child who has not had measles, and the time to watch him is between eight and fourteen days after exposure."

The bulletins are excellent and could be copied elsewhere with advantage.

As to Diphtheria.

Why die from diphtheria? It is unnecessary.

Diphtheria + delay = Death.

Diphtheria works while you sleep.

Spare the cure, kill the child.

Diphtheria's worst enemy, Antitoxin; its best friend, Tomorrow.

In the presence of diphtheria, get the Do-It-Now habit.

If in doubt, use antitoxin. Better be safe than sorry.

Poverty excuses no one; treatment can be had free, if necessary. Ask for Health Bureau early. Available day and night.

Keep well children away from children who have their throats tied up.

To keep the undertakers busy, neglect the "simple sore throats."

Don't break quarantine and spread diphtheria. In other words, don't be a murderer.

No human being will visit the sick and then associate with the well; inhuman beings do.

Don't leave a diphtheria house until the Health Bureau says it's safe to do so.

A diphtheria neighborhood is a loose neighborhood; it is a bad neighborhood. Move out.

Despise the wretches who break quarantine and slaughter little children. Smite them. If you can't, tell us, and we will.

The little that some "thrifty" (?) people keep from the doctor, they give to the undertaker, and then some.

Be on the alert; make the undertaker wait.

Health Bulletin, Portland, Ore., January 5, 1914.

Coöperation in Good Housing Maintenance.

The *Bulletin of the Chicago School of Sanitary Instruction* contains in its issue of January 17 a discussion of the division of responsibility for the up-keep of tenements. Manifestly this responsibility is shared by the tenant the landlord, and the city. The article attempts to define the limits of this responsibility and from it we clip the following selections:

"The responsibilities with which the landlord is charged relate chiefly to structural maintenance; the tenant has an immediate responsibility for certain conditions in the up-keep, while the city's responsibilities relate to maintenance of the surroundings, the removal of waste and like matters, and especially to the prevention and suppression of nuisances.

The Tenant's Responsibility.

"In the very nature of the case the occupant of the premises is responsible for the removal of ordinary accumulations of waste, such as rubbish, garbage and ashes, from within the building and the keeping of the walls, floor, and all inferior parts of the premises occupied by him in a clean condition. Aside from the carelessness and damage of a willfully malicious tenant, many occupants of dwellings and apartments fail to realize that the requirements of ordinary housekeeping with respect to cleanliness and removal of accumulations must be placed on them, and that they are responsible, so far as these matters of control are concerned, for the up-keep of the premises which they occupy.

"The occupation of premises by any tenant imposes on him the duty of proper protection of the plumbing, and, above all, its maintenance in a cleanly condition."

"Many complaints are received by this department with respect to waste accumulations, dirty walls, floors, woodwork and toilets which, when investigated, show that the fault is the tenant's and that he has not fulfilled the duty resting on him of keeping these various surfaces and portions of the building for which he is responsible in proper condition.

The Landlord's Responsibilities.

"The responsibility of the landlord for ordinary maintenance and repair is, of course, somewhat less in a single dwelling than in a tenement house, as his relation to the premises is somewhat remote in the case of a dwelling rented to a single family, and the responsibility of the tenant correspondingly greater with respect to many small matters of repair and up-keep.

"It is a responsibility of the landlord to turn over the given apartment to his tenant in good repair, in clean condition, and, in general, entirely fit for occupation, and to have in his lease or by some other method of record a clear understanding as to the renewal within the rooms by painting, calcimining, papering, etc., at fixed intervals.

The City's Responsibility.

"The responsibility of the city relates mainly to conditions exterior to the dwelling

rather than to those within the building. It is clearly the duty of the city authorities to conduct the municipal housekeeping, such as the care of the streets and alleys, the prompt removal of rubbish, garbage, etc., and matters of like nature, in a manner which will facilitate the convenience and protect the health of the community."

Diphtheria Antitoxin.

The November report of the Rochester (N. Y.) Bureau of Health gives the following directions for the therapeutic use of diphtheria antitoxin:

"Diphtheria, virulent, septic or laryngeal, is frequently ushered in with hoarseness, restlessness and difficult breathing, with only a little rise in temperature and pulse. These are the cases in which large doses of diphtheria antitoxin should be given immediately. Dr. William H. Park, bacteriologist of New York City Board of Health, has proven that in these severe cases antitoxin should be administered early and in one large dose. He says that when the same amount of antitoxin is administered intravenously there is a gain of some hours in the manifestation of the beneficial effects of the serum and that the final effects of the same number of units are greater than when administered subcutaneously. Five thousand units given intravenously have as great an effect as 20,000 given subcutaneously. A German investigator says that the maximum antitoxin content of the blood may not be reached for as long as eighteen hours after the subcutaneous injection of antitoxin. One investigator reports the recovery of 200 patients treated by intravenous injection of diphtheria antitoxin, 90 per cent. of these cases being laryngeal diphtheria.

"The technique of intravenous injection is very simple. When a vein at the usual site (the bend of the arm) cannot be seen, it can be entered by feeling after two or three trials. After a tourniquet has been placed in position and the vein brought into view or felt, the needle unattached to the syringe is entered and a spurt of blood from the free end of the needle is the signal for releasing the tourniquet and administering the antitoxin. In order to discover anaphylaxis or hypersensitiveness, it

is recommended that only a drop or two of the antitoxin be injected at first; after a pause of a minute or two, five or ten drops injected; and then, after a pause, if there are no symptoms of disturbance of breathing or circulation, a full dose of the antitoxin is to be given. Where the diphtheria antitoxin of the State Health Department is administered to sensitive persons in the large doses here recommended a single needle may be left in the vein and syringe after syringe pushed on to this needle, thus obviating the withdrawal of the needle and the necessity for frequent skin puncture."

The Cause and Cure of Colds.

The State Board of Health of Florida has established a *Press Service* and is now regularly sending out bulletins to the papers of the state on various topics so treated as to be suitable for popular reading. Below we quote some clippings from the bulletin of November 5 which discusses colds, their cause, their real importance and how we are to prevent them:

"Now look out for colds!

"This advice, as a paraphrase of the old-time almanac editor's warnings, is particularly timely at this season, although no one knows why the name was given to that condition of sneezing, wheezing and general miserableness that we wrongly associate with the cooler seasons of the year. It is a fact that colds are more prevalent in the colder months, but it is due only indirectly to lower temperatures, because at these seasons we close the doors and windows, shut out more than in summer the free circulation of fresh air, and breath too much an atmosphere which is vitiated by being depleted of oxygen.

"Most of us cherish the idea that a sudden draft of chilling air is the cause of a cold. More than likely this is but a coincidence. The doctors have concluded that this affliction is infectious, that it may be carried from one person to another by a germ, and it is often noted that when one member of the family has a cold, the others are quite likely to 'catch' it. That all do not suffer together is due to the fact that some individuals have a power of resistance that makes them immune, at least for the time.

"The germs that cause colds may be carried from one person to another through personal contact or close proximity. They are expelled from the patient by sneezing, violent coughing, in the sputum and in the mucous discharges from the nostrils. To escape catching cold from another person these germs must not be permitted to enter the system, which may be made possible through a too close proximity with the afflicted one.

"It is well known that oxygen is a purifying agent, invigorating and strengthening because of its cleansing power. The oxygen from the air breathed into the lungs is carried into the blood where it reaches the leucocytes and strengthens them for their important work. Naturally, also, a lack of oxygen exhausted from the air by breathing or other means, induces a lack of resisting power. This means that a plentiful supply of fresh, oxygen-laden air brought into the home by perfect ventilation is the best health preservative known to medical or sanitary science, and it is one of the best cures, too. It is the best preventive of colds that can be found, and it has the advantage of being decidedly cheap."

Ante-natal Care.

A very important addition to the methods used in the prevention of infant mortality is that recently introduced by the Bureau of Child Hygiene of the New York City Department of Health and reported in the weekly bulletin of the department (November 22, 1913) as follows:

"Another link has been added to the chain of effort in the reduction of infant mortality by extending the activities of the milk stations to include the care of pregnant women. Thirty-six per cent. of infant mortality occurs in the first month, and it is safe to infer that the majority of these children die either because the mothers were physically unfit to bear healthy children or because of their ignorance of the proper care of their offspring during the first weeks of life. The milk station at 2287 1st Avenue, Manhattan, has been selected as a center for the instruction of nurses in pre-natal work. When sufficiently familiar with its details, they will be

assigned to other stations to carry it on. The nurses assigned to this work canvass the neighborhood and persuade expectant mothers to place themselves under medical care as early in pregnancy as possible; they communicate with the doctor of the hospital under whose care the patient may be, and explain the desire of the department of health to coöperate and the manner and degree in which it is prepared to do so; they instruct mothers in detail with regard to diet, fresh air, food, exercise, clothing, etc., and impress upon them the importance of nursing their infants.

"In normal cases visits are made every ten days ante-partum and every three days post-partum; in abnormal cases, as often as may be necessary. Visits are made for one month after labor. The mothers are then requested to enroll their children at the milk station, where they are cared for during their first and second years.

"To date one hundred and seventy-five mothers have been enrolled, of whom twenty-five have given birth to children. While it is too early to show by figures what can be accomplished, it is most gratifying to note the appreciation of the mothers and the enthusiasm of the nurses."

Vital Statistics in North Carolina.

"Beginning November 15, the state-wide Vital Statistics Law will go into effect. This law would have gone into effect six weeks earlier had not delays occurred in getting out the necessary blank forms, etc. However, there will still be six weeks in this year in which the local registrars, doctors, nurses, undertakers and others may get accustomed to the new law. After that North Carolina should have almost perfect registration, which will entitle us to recognition as a registration state along with about twenty-three other states in the Union.

"Any one desiring to register births and deaths that may have occurred prior to the time the law goes into effect may do so by presenting the facts in the case to the state registrar."

Press Service, North Carolina Board of Health, November 17.

Kansas State Board of Health.

Dr. S. J. Crumbine of the Kansas State Board of Health has again demonstrated his originality and progressive spirit in the December number of his monthly bulletin. This is a special number devoted to "Topics in studies of food and drug adulterations, public health, and sanitation, suggested for the use of women's social study clubs." Its object is "to interest the women of Kansas in the race of tomorrow, and to enable them to conserve that which is the rightful inheritance of every child of every mother, a perfect constitution and a healthful, happy existence."

The course of study is planned to extend over the nine winter months and in order to allow for two meetings a month is divided into the following seventeen topics: A study of Food Values; Food Adulteration; Sanitation of Food Supplies; Drug Adulteration; Drug Addiction, Rural Sanitation and Its Relation to the City; The Value of Vital Statistics; Sanitation of the Public School and Physical Supervision of School Children; The Cost of Preventable Disease. A Study in Efficiency; The Control of the Red Plague; Has Kansas Slum Districts and Housing Problems; Longevity and Public Health; The Proper Disposal of City Garbage and Waste; What Constitutes a Wholesome Water Supply and Its Value to the City; A Study of Occupational Diseases and Preventable Accidents; Public Health, the Basis of General Prosperity.

Under each topic are suggested titles of papers to be prepared by members of the club. As a type we quote the program on the Proper Disposal of City Garbage and Waste; (a) The Principles of Sewage Systems; (b) Individual House Wastes and Disposal Methods; (c) The Ideal Garbage Can; (d) The Prevention of Flies; (e) Methods of Collection and Final Disposal of Garbage; (f) What Are We Doing in Our Town in this Regard?

The bulletin contains also lists of books, periodicals, and state and national health publications which will be found helpful for reference in the preparation of papers.

The whole idea is excellent and with a little help and encouragement from the local health

department or from physicians, who could coöperate on some of the programs, should produce very good results. Many of the women's clubs are tiring of the classical study courses on "The South American Essayists" or "The Poetry of Afghanistan," and would gladly turn to more practical and productive study but lack proper guidance which will turn their energies into the most useful channels. The effect of such a course as Doctor Crumbine proposes could hardly fail to be plainly felt in any community.

Mechanical Fakes.

The opponents of serum therapy have been caught this time and shown up in their true light. A discussion of "Mechanical Fakes" in the *Health Bulletin* of the state of North Carolina takes up the Oxydonor, Oxygenor, etc., and shows how absolutely worthless they are, from the electropoise which was simply a nickel plated brass tube through which the body was supposed to absorb oxygen, to the Oxygenator which the University of Vermont found to contain the waste product of a manufacturing plant. The comment on this last contrivance is quoted as follows:

"According to 'Nostrums and Quackery' it would seem that the Oxypathor is the youngest member of the family group or the last alias adopted by Sanche's original idea.

"In many ways," says Nostrums and Quackery, 'this last type of gas-pipe cure is the worst, inasmuch as claims are made for it that are not only absurd but dangerous. For instance:

"*Diphtheria*: This overwhelming child's disease finds its supreme master in the Oxygenator. No earthly power except the Oxygenator can take the slowly choking child and with speed, simplicity and safety bring it back to health.

"Don't jeopardize the health and life of your children by allowing to be injected into their veins and blood the often fearfully contaminated and death-dealing serum of an animal, otherwise known as antitoxin."

"It is difficult to restrain one's indignation at the thought that such viciously cruel lies as these are permitted to be scattered broadcast. Let the neurotic and neurasthenic adult, if he can convince himself that a nickel-

plated piece of gas-pipe possesses curative properties, experiment with it on his own person if he wishes. But that a helpless child in the throes of a fearfully dangerous—and yet, rightly treated, curable—disease, should be allowed to suffer and die because ignorant parents have been persuaded to rely on these mechanical frauds, is no less than criminal. As for the miserable harpies who for a few filthy dollars will write such cold-blooded untruths as those quoted above, the safety of society demands that they be put where they can do no further harm."

Sediment Testing for Milk.

Another step in the supervision of the milk supply has been taken by the Board of Health of New York City. Believing that the amount of dirt in milk affords a criterion of the way in which it has been handled and perhaps realizing that bacterial count was subject to criticism as an index of contamination on account of the large increase taking place proportionally to increase in time and temperature of storage, the board, on December 22, 1913, passed the following resolution:

"WHEREAS, The protection of the public health requires that the milk supplied and furnished in the city of New York be clean and wholesome, and for the accomplishment of this purpose it is advisable that a sediment tester be used in creameries from which milk is shipped to the city of New York, and that all milk delivered to said creameries should be tested by and through a sediment tester, therefore, be it

"Resolved, That the following regulations for the protection of life and the care, promotion and preservation of health, be and the same are hereby adopted to take effect on and after the first day of February, 1914:

"(1) That a sediment tester approved by the Department of Health of the City of New York, be used in all creameries shipping milk to the city of New York.

"(2) That all milk received at any creamery so shipping milk as aforesaid be tested thereat by the person having the management and control of such creamery at least once a week, and that the results of such test be posted in a conspicuous place in the cream-

ery and duplicates of such test be forwarded to the department of health at the end of each month.

"(3) That the photograph or gauge established by the Board of Health of the City of New York be used as a standard in the creameries herein referred to in determining whether milk contains excessive sediment.

"(4) That where the maximum of sediment is shown to habitually exist in milk tested as aforesaid at any creamery it will constitute sufficient cause to rate the milk as Grade C, with the right of said board to exclude such milk from the city of New York when such conditions continue."

The Duty of Physicians Relative to Preventive Medicine.

The following article from the *Cleveland Medical Journal* of November, 1913, is a hopeful sign, inasmuch as it shows that physicians are awakening to a realization of the fact that their responsibility lies in the direction of prevention as well as cure of disease and that the usual course of training in the medical schools does not lay sufficient emphasis on this fact nor prepare men to be really efficient in public health work without some additional time spent in specialization.

"At the present time considerable attention is paid to preventive medicine. The majority of medical colleges have a department of preventive medicine and hygiene, and a certain number of hours is allotted to lectures on these subjects. Considerable attention, too, is given to the prevention of infant mortality, to question of fresh air and sunlight and to the necessity of pure water and milk supply. Boards of health have accomplished a great deal in limiting the number of contagious diseases, by requiring physicians to report these cases and to institute proper isolation, and by the medical inspection of schools.

"Is the family physician doing all in his power to prevent disease among his patients? Take for example, in vaccination we have an almost certain means of stamping out smallpox, yet how many physicians urge upon their patients the necessity of having their babies vaccinated at the third or fourth month? Little objection would be met on the part of parents if the need of this pre-

caution was urged upon them. Every physician knows or should know that the ordinary head cold is very contagious, and yet we very seldom see an attempt made to keep one child in a family who has a severe coryza isolated from the other children. In babies, particularly, this condition may be followed by such disastrous results as pharyngitis, cervical adenitis, otitis media, and mastoiditis. Surely any precaution which might protect a baby from such illnesses is worth taking. One very hopeful sign is that the intelligent laity are beginning to see the necessity of isolating cases of 'cold' and 'sore throat,' and the physician who does not advise that these precautions are carried out will be supplanted by one who does.

"Typhoid fever can now be stamped out

almost completely by vaccination, as shown by the convincing results reported by Major Russell in the United States Army. It is distressing, however, to see how slow physicians are in advising their patients as to the necessity of being vaccinated against typhoid.

"What is the cause of this indifference among physicians? One reason is that they are so occupied in treating disease that they do not pay enough attention to prevention. Another and probably the strongest reason is that in our medical colleges today, too much attention is paid to the big problems of diagnosis and pathology and not enough to therapeutics, especially to the prophylaxis of disease. It is too common a saying that anyone can treat disease, once the diagnosis is made."

PERSONAL NOTES.

The following have been elected to membership in the American Public Health Association since the meetings in Colorado Springs last September:

Elected October 25, 1913.

Mr. Max J. Colton, Summit, N. J.

Mr. Fred L. Crocker, Birmingham, Ala.

The International Committee of the Y. M. C. A., New York, N. Y.

Mr. Herbert I. Reid, Colorado Springs, Col.

Mr. Charles D. Howard, Concord, N. H.

Mr. Charles A. Haskins, Lawrence, Kan.

Dr. John M. Dodd, Ashland, Wis.

Dr. William K. Lindsay, Sacramento, Cal.

Mr. Frederick T. Robson, San Francisco, Cal.

Dr. William J. Malloy, Muncie, Ind.

Mr. George H. Hazlehurst, Wilmington, N. C.

Elected December 9, 1913.

Mr. Frederic Bonnet Jr., Worcester, Mass.

Mr. Victor George Heiser, Manila, P. I.

National Organization for Public Health Nursing, New York City.

Mr. Oscar C. Pickel, Canal Zone.

Mr. George M. Wells, Canal Zone.

Mr. Allen F. Gillihan, Oakland, Cal.

Dr. W. H. Hattie, Halifax, N. S.

Elected December 27, 1913.

Dr. Charles M. Smith, Fredericksburg, Va.

Mr. William H. Gould, Toledo, Ohio.

Mr. Andrew Foster Allen, Campello, Mass.

Dr. Elmer C. Jackson, Ashland, Wis.

Dr. Emery R. Hayhurst, Columbus, Ohio.

Mr. George H. Shaw, Brooklyn, N. Y.

Department of Health, San Francisco, Cal.

Mr. Robert N. Turner, Boston, Mass.

Mr. Willis T. Knowlton, Los Angeles, Cal.

Mr. Edward Allyn Lambert, Bridgeport, Conn.

Elected January 22, 1914.

Mr. James E. Rush, Madison, Wis.

Mr. Otto Rahn, University of Illinois, Urbana, Ill.

Miss Jane B. Patten, Boston Mass.

Mr. Fred Wilbur Tanner, Urbana, Ill.

Mr. Herbert M. Hill, Buffalo, N. Y.

Mr. Morris Cohen, New York City.

Mr. John Hall, Long Branch, N. J.

Mr. Arthur M. Buswell, New York City.

Elected January 31, 1914.

Dr. Charles Morton Gould, Superior, Wis.

Mr. Lloyd D. Smoot, Jacksonville, Fla.

Mr. Wallace Todd Eakins, Trenton, N. J.

Dr. Ellen A. Stone, Providence, R. I.

Mr. William Henry Baldwin, Washington, D. C.

Dr. Walter A. Plecker, Richmond, Va.

Dr. L. A. Bize, Tampa, Fla.

Dr. U. S. Grant, Tampa, Fla.

Mr. John A. Kingsbury has resigned as director of the A. I. C. P. of New York City to become Commissioner of Charities under Mayor Mitchell.

PUBLIC HEALTH NOTES.

A Life Extension Institute.

A coöperative movement, largely on the part of insurance companies, for the conservation of human life, was recently launched in New York under the name "Life Extension Institute." E. E. Rittenhouse, conservation commissioner of the Equitable Life Assurance Society, will be the president and Dr. Eugene L. Fisk of the Postal Life Insurance Co., medical director. The Board of Directors includes ex-president William H. Taft, chairman; Harold A. Ley of Springfield, originator of the plan; Prof. Irving Fisher of Yale, E. E. Rittenhouse, Robert W. De Forest, Frank A. Vanderlip, Dr. E. R. L. Gould, and Charles H. Sabin of New York, Francis R. Cooley of Hartford, Conn., and Henry A. Bowman of Springfield, Mass.

"The method to be used to prolong life is very simple and the same as applied to ordinary machinery—inspection and repair." says Professor Fisher in an interview reported in the *New York Times*. "Any person, whether as a policy holder in a company which employs the institute or as an outside individual, may have an expert examination made of his physical condition. If he is entitled to the examination as a policy holder, he has it without cost to himself.

"After the human machine has been inspected, the individual will be advised to see his family physician, who will be furnished a full statement of the results of the examination—high blood pressure, or whatever the disability may be. Doctor Fisk, on the basis of his experience in this work for the Provident Savings and Postal Life, is convinced that the simple early discovery of slight 'impairments,' which would induce the impaired man to consult his doctor before it is too late, has greatly reduced the death-rate among those who had the good fortune to make the examinations.

"The institute will employ experts throughout the land to act as medical examiners and to coöperate in this new movement to prevent and to check disease. This suggests the method of the Chinese, who employ

physicians to keep them well instead of to treat them after they have become seriously ill.

"The institute plans to make arrangements not only with life insurance companies but with schools, industrial establishments, clubs and individuals, as well as to coöperate with hygienic agencies and movements of all kinds, including those connected with the tuberculosis movement, the social hygiene movement, the eugenics movements, the public health departments, Federal, state and municipal, and even popular gymnastics and sports. It will establish laboratories in the larger cities for analysis of blood, urine, etc., of the persons examined.

"The Hygienic Reference Board will aim ultimately to settle scientifically, so far as possible, the many disputed questions of personal hygiene. As yet personal hygiene has been neglected, especially in America, and 'how to live' is a debatable question even among experts. The board will secure the coöperation of savants throughout the world to solve such fundamental problems as how best to ventilate our houses and how best to clothe and feed our bodies. In this way it is hoped to steer a scientific course between the Scylla of foolish fads which beguile the unwary and the Charybdis of conventional ways of living which most of us accept blindly because others have accepted them before us."

The Typhoid Fly

"When all the evidence shall have been garnered the domestic fly will appear as the greatest offender known to the sanitarian. Not only is this pest a mechanical carrier of infection, but, as shown by recent experiments performed by V. Ph. Berezoff at the Institute of Experimental Medicine in St. Petersburg (*Roussky Vrach*, June 29, 1913), it harbors pathogenic bacteria in the interior of its body for long periods. This investigator obtained from the hospitals of St. Petersburg about 150 hibernating and frozen flies. After carefully disinfecting and washing the exterior, he dried the flies and made cultures

from the contents of the intestinal tract. Powdered and emulsified flies were also injected into animals. By these methods, the author succeeded in isolating staphylococci, proteus and colon bacilli, streptococci, twenty-four varieties of non-pathogenic micrococci, a sarcina, twenty-five varieties of bacilli, two species of fungi, and some unidentified bacteria—quite a formidable list. These bacteria, then, remained viable in the intestinal tract of the flies for four to five months. Another experiment performed by the author shows the menacing possibilities of the house fly still more forcibly. In the early spring, when the flies awake from their winter sleep, he fed a number of flies on cultures of pathogenic bacteria, the typhoid bacillus, the paratyphoid, the pyocyaneus, streptococci, diphtheria bacillus, and the cholera bacillus. In the course of a week the flies, having laid their eggs, died. The dead flies were then allowed to remain for a month or more and then treated in the same manner as the hibernating flies. In each case a pure culture of the organism on which the fly was fed was obtained, with the exception of the diphtheria bacillus, the paratyphoid A, and the cholera bacillus. These experiments prove that the fly may act as a splendid incubator for pathogenic bacteria, retaining them in a living state for months. It would seem that the usual method of swatting the fly is not free from danger, as the bacteria in the intestines may thus become liberated. Dead flies should either be washed down into a sewer or else cremated, the latter being probably the preferable method."

New York Medical Journal,

Nov. 22, 1913.

Doctor Savage's Report on Ptomaines.

A review of Dr. William G. Savage's report to the Local Government upon *Bacterial Food Poisoning and Food Infections* is contained in the November number of *Public Health* (London).

While it is true that a few outbreaks of food poisoning are reported each year, many other extensive outbreaks go unreported. Such outbreaks usually show one article of

food to have been eaten by all the sufferers. There is, as a rule, a definite incubation period, accompanied by the same sort of symptoms. The chemical theory of ptomaines as "toxic bodies from putrefactive decomposition" seems to be called into question. At least it seems to explain no more than limited outbreaks.

Although Doctor Savage considers this theory, he does not feel that experimental work on *B. proteus* (the most important of the putrefactive organisms) warrants an acceptance of it. In none of the outbreaks ascribed to *B. proteus* was it established to be the cause, although he cautiously admits it as a possible cause in individual cases or limited outbreaks.

The suspected cause of food poisoning is the Gaertner group. *B. enteritidis*, a member of this group was isolated in 1888 by Gaertner from a fatal case and from the organs of the cow supplying the meat in a meat-poisoning outbreak in Germany. Doctor Savage has carefully studied seventy-nine outbreaks in England as well as others on the continent. The Gaertner group was shown to have been isolated in 71 per cent. of the British cases, where bacteriological investigations were carried on. In the remaining 29 per cent. the Gaertner group could not be excluded. On the continent all of the cases showed at least one organism of this group. This would indicate that *B. coli* and *B. proteus* are insignificant.

Treating the Gaertner group as the cause, prevention has not become any the easier. The group has been shown to be the cause of disease in certain animals used for food. It is also found in other animals capable of infecting food. Furthermore vegetable foods have shown an infection with these organisms. In some cases meat from healthy animals has become infected subsequent to slaughter.

Doctor Savage deals with three possible hypothesis as explaining the method of infection. The first, that the bacilli are of human origin, he dismisses as entirely untenable. The second is that the bacilli are derived from ordinary fecal infection of food. This would afford an easy explanation for many cases of infected food, but would imply that

the Gaertner group is a natural inhabitant of the intestines. The latter conclusion is negated by the investigations of Doctor Savage and others. Furthermore, outbreaks would be much more common because of the unusual opportunities for fecal contamination in our present-day methods of handling meat-foods.

The last hypothesis seems to appeal to Doctor Savage as the most tenable. This is, "that food-poisoning outbreaks are due to infection of the food with virulent Gaertner group organisms (or other special bacilli) derived from animals which are either at the time suffering from disease due to Gaertner group bacilli or acting as carriers of those bacilli." This would seem to explain cases where the infected flesh of the diseased animals is eaten or where infection has taken place during or after preparation. While not proved as yet, this theory seems to be supported by many facts.

The necessity for discovering all of the possible sources of infection is quite evident. At the same time there should be enforced in and about slaughter-houses the most detailed rules for cleanliness. In addition the place in which food is prepared should be separated from the slaughter-house proper. Failure to exercise care in the preparation of made-foods is doubtless the greatest cause of these epidemics.

W.E.B.

Industrial Accident Legislation.

"According to a bulletin issued by the American Association for Labor Legislation, describing the labor laws passed by Congress during the year 1913, twelve states have passed new or strengthened old laws requiring the reporting of accidents on railways and in mines and factories. Four new states have required physicians to report the most common occupational diseases, and New York and Connecticut have extended their laws to include brass and wood alcohol poisoning. Laws requiring sanitation, dust and fume removal, and washing facilities in factories were widely adopted, and three great lead-using states, Missouri, Ohio, and Pennsylvania, have enacted scientific provisions for protection against trade diseases,

particularly lead poisoning. Safety requirements for mines were made more stringent in fifteen states, while twenty-six states demanded greater safety for railroad employees. During the year, Ohio, Massachusetts, California, New York, and Pennsylvania, have reorganized their labor departments, and in over a dozen additional states factory inspection departments have been reorganized and enlarged."

New York Medical Journal, December 13, 1913.

Sterilization of Milk by Electricity.

"The Bacteriological Department of Liverpool University was approached some time ago by the Infant Life Protection Committee of the same city, with a view of ascertaining whether milk could be sterilized by electricity, and whether such a process had any advantages over the existing system of pasteurization. The results of the researches made by Dr. J. Beattie, the city bacteriologist, have now been reported. It was found that the electrical method is more economical; the *Bacillus coli* and its allies were invariably destroyed, and that there was an enormous reduction in the total number of bacteria of all kinds. The keeping qualities of the milk were greatly improved; the nutritive properties were not in any way affected, nor was the taste of the milk in any way altered. Tubercular milk was also submitted to the electrical method, and it has been found that the tubercle bacilli can be destroyed by this method."

The Journal of State Medicine, September, 1913.

Report of Department of Agriculture.

The annual report of the Department of Agriculture for 1913 contains the following material on public health topics. The clippings are from a summary which has been sent out for general publication:

Country to Be Districted to Enforce Food and Drugs Act.

Certain reorganizations have been effected in the Bureau of Chemistry looking toward more effective administration of the Food and Drugs Act and to greater constructive technological assistance to manufacturers in

avoiding waste, reducing cost of manufacture, and to help them develop purer products which will comply with the law. The country will be divided into several districts each under the direction of a competent official. All branch laboratories and food inspectors will be under single direction and will work together instead of being independent of each other, a condition which led lack of coördination in the past. Certain branch laboratories will be consolidated because the work can be done more effectively and more cheaply in the larger central laboratories which are provided with complete equipment and specializing chemists. Effort will be made to make the act more of a hygienic measure through increased attention to milk, eggs, oysters, and fish, which are subject to organic contamination and may become carriers of disease.

To bring about greater harmony in the work of the state food officials and the department in food and drug work, the secretary called a conference which was attended by representatives of thirty-two states, the District of Columbia, and Porto Rico. It is believed that this conference has promoted much better understanding and will lead to a number of specific improvements. An office which will act as a clearing house of information among the state and Federal food and drug officials will be established to prevent duplication of work and promote harmonious action and coöperation. Experience has revealed certain weaknesses in the food and drugs act—notably the lack of provision for legal standards, and its failure to apply to certain external remedies. The secretary will ask that authority be granted to prepare and submit such amendments to this law as may be deemed needful to safeguard the health of the people, establish standards, better define drugs, improve the food supply, and promote uniformity in the matter of food legislation.

*To Study Disease-Carrying Insects which
Affect Agriculture.*

The effect of the malaria-carrying mosquito on agricultural production has been made the subject of investigation on southern plantations. Attention will be given to

other disease-transmitting insects such as the house fly, stable fly, and spotted fever tick, which have a bearing on the health of rural populations. Satisfactory progress has been made in a study to discover means whereby the breeding of flies in manure may be prevented without lessening its fertilizing value.

His Right Course Is Clear!

"When a man honorable, honest, or even decent has made against another a serious charge and later learns on unquestionable authority that the charge was false, he promptly withdraws it, with apologies and expressions of regret proportioned to the seriousness of his accusation. If harm has resulted from what he said, he repairs it to the extent of his ability.

"These statements are the mere commonplace of courtesy and morality, of course, but none the less it seems necessary to commend them with earnestness and emphasis to the attention of Frank Stevens, one of the most voluble and impassioned speakers at the Congress of Antivivisectionists which just closed in Washington.

"Mr. Stevens, in one of his orations, accused Doctor Noguchi of the Rockefeller Institute of having, as an 'experiment,' injected into a large number of poor children the 'poison' or 'germs' of a terrible disease. In a letter printed yesterday, and in terms surprisingly calm and temperate, Doctor Simon Flexner told just what Doctor Noguchi did—a wholly different thing, of now widely recognized utility, and carrying no possibility of infection. Doctor Flexner also noted that this information was not then given for the first time by him, and mentioned several ways in which it might have reached Mr. Stevens before. Doctor Flexner, being a cautious as well as a kindly man, did not say that it did reach Mr. Stevens before.

"That provides Mr. Stevens with an opportunity to do the right thing—gracefully. He has only to admit that he did not know what he should have known—that he made in gross ignorance a hideous charge against a great scientist—that he is sorry for it. When he does that, taking pains, of course, to spread his retraction as

far as his accusation went, then he will have proved himself a rash but well-intentioned man. Incidentally, he will have broken every anti-vivisection record—done something that no anti-vivisectionist ever did before. Likely enough he will have wrecked the whole anti-vivisection cause, but what of that, so long as he escapes the agonies of remorse from which he presumably is, because he ought to be now suffering?"

New York Times, December 13, 1913.

Sex Education.

"To what extent can sex instruction be given in the public schools? Wide difference of opinion still exists among school men on the subject, judging from reports received at the United States Bureau of Education. There is widespread recognition of what President Foster of Reed College, calls 'The Social Emergency,' and general agreement as to the need of action against the social evil but when it comes to the question of what part the public school shall play, the ideas range from a detailed plan of sex instruction beginning in the elementary schools to a determined opposition to any form of sex education whatsoever.

"Prof. Thos H. Balliet of New York University outlines several points of attack in sex education. He believes sex instruction can now be given to the following groups: (1) to parents, by means of lectures; (2) to enlisted men in the army and navy, where the need for it is urgent; (3) to college students, both men and women; (4) to young people in Y. M. C. A., and similar associations. Doctor Balliet considers sex instruction to college students particularly valuable, because it will enable them to impart sex knowledge in turn to pupils in elementary and secondary schools, as soon as the public is prepared for this step."

Wisconsin State Board of Health Bulletin.

Insect-Borne Anthrax

Experiments are now being carried on by M. B. Mitzmain, veterinary entomologist of the Philippines, to determine the possibility of the transmission of anthrax by means of the bite of *Stomoxys calcitrans* and of *Tabanus striatus*. The fly is allowed to

bite an infected animal in a stage of the disease so advanced that the peripheral circulation contains tremendous numbers of the bacteria, a condition existing only for a short time before death. It is then allowed to bite a healthy animal and in all cases carried out in this manner the animal has become infected and died. *Stomoxys calcitrans* has transmitted the disease after an interval of twenty minutes following the biting of the infected animal and has been shown to harbor the bacteria in its feces fourteen to seventeen days.

Migration of Consumptives in Interstate Traffic.

The United States Public Health Service has undertaken an investigation of the migration of tuberculous persons in interstate traffic. Officers of the service are now making studies of this subject in California, North Carolina, and Texas. The object of the investigation is to determine the extent of such migration, to ascertain its effects on the traveling public, and its influence from economic and public health standpoints on the communities to which tuberculous persons resort. The work was undertaken at the suggestion of the Texas Public Health Association. The service is also preparing to undertake a thorough and systematic investigation of conditions relating to the prevalence and prevention of tuberculosis in the city of Cincinnati, working in coöperation with the Anti-Tuberculosis League of that city.

Compensation for Trichinosis Infection.

A woman of Glen Lyon, Penn., has been awarded a verdict of \$3,000 against a meat company for the death of her husband who died after eating pork sent out from the packing house of the company in Chicago. Seven members of the household were stricken on January 31, 1911, after eating pork. The husband died and the others recovered.

A post-mortem examination showed that the pork was infected with trichinæ. Examination of the stomach and internal organs showed that he died from trichinosis.

The company tried to dodge responsibility on the claim that the meat had passed govern-

ment inspection, but Judge Woodward held that the company was bound by law to furnish wholesome meat.

If it is found possible to get similar decisions in other states the result may be more effective in improving our meat supply than any amount of government inspection.

Medical School Inspection.

The value of medical inspection of schools and the employment of school nurses seems to be finding favor wherever it has received a fair trial. In his last report to the Common Council Doctor Emerson, the superintendent of Education of Buffalo, N. Y., calls attention to the activities of the medical inspectors in recommending care and treatment for children with physical defects. He says:

"In this way many children have received medical and surgical attention who otherwise might still be suffering in body and retarded in their progress through the schools. Medical supervision of this kind facilitates the advancement of pupils from grade to grade and reduces the number of repeaters in our schools, thus lowering the per capita cost of instruction. It raises the general average of efficiency both for pupils and for teachers, and is, therefore, a measure of the wisest economy."

Referring to the services of the school nurses, he says that they "have supplemented the work of the doctors by treating many conditions that would otherwise have remained uncared for in the families of the poorest children, and by visiting the homes of those who were neglected."

The superintendent believes that it is most desirable to increase the number of school nurses in order to cover the needs of the schools more efficiently. He notes the growth during the past year of the special classes in the public schools and looks forward to an increase in the number of mental examiners, who are needed "in order that more attention may be given to the physical as well as the mental needs of this unfortunate class of sub-normal children."

The American Society for the Control of Cancer has recently issued the following facts concerning this disease:

The Campaign Against Cancer.

Its Frequency.

Cancer is of greater frequency in adult life than tuberculosis, pneumonia, typhoid fever, or digestive diseases.

In 1913 there were about 75,000 deaths from this disease in the United States.

One person in eleven at ages forty and over dies of cancer.

One woman in eight and one man in fourteen at this period of life is attacked by the disease with fatal results.

Largely because of public ignorance and negligence this terrible scourge now proves fatal in over 90 per cent. of the attacks.

Of the 75,000 deaths from this disease in the United States in 1913 about 30,000 were deaths from cancer of the stomach and liver, 12,000 from cancer of the uterus and other organs of generation, 7,500 from cancer of the breast and about 25,500 from cancer of other organs and parts.

Its Victims.

Cancer respects neither race, creed nor social position.

It is the common enemy of all mankind, attacking rich and poor alike.

It comes at the most useful period of life, at the age when the care and guidance of children and business responsibilities make the mother and father most useful to society.

Its Nature.

Cancer is at first invariably a local disease.

It is easily cured when recognized and removed by competent surgery early in its course.

It is practically always incurable in its later stages.

Delay in thorough examination and prompt operation, if the disease be present, is not merely dangerous—it is fatal.

Conference on Race Betterment.

Four hundred men and women of prominence met in Battle Creek January 8-12 to assemble evidence of race deterioration and to consider methods of checking the downward trend of mankind. The meeting was known as the First National Conference on Race Betterment. Through the coöperation of the press, the objects and aims of the

conference have been very widely disseminated and a resultant influence for better race ideals is anticipated.

The conference had its inception in the efforts of four men, particularly interested in race betterment—Rev. Newell Dwight Hillis, pastor of Plymouth Church, Brooklyn, N. Y.; Dr. J. H. Kellogg of the Battle Creek Sanitarium; Sir Horace Plunkett, former minister of agriculture for Ireland; and Prof. Irving Fisher of Yale University. At the invitation of a central committee chosen largely by these men, fifty men and women of national prominence in the fields of science and education consented to share in the program. Their addresses, together with open discussion of many of the points considered, constituted a very widespread study of all phases of evident race degeneracy and the advocacy of many ideas of reform. Some of the suggested methods of improvement are frequent medical examination of the well, outdoor life, temperance in diet, biologic habits of living, open-air schools and playgrounds, the encouragement of rural life, the segregation or sterilization of defectives, the encouragement of eugenic marriages by requiring medical certificates before granting license, and the establishing of a eugenics registry for the development of a race of human thoroughbreds.

Among those having a share in the program were: Rev. Newell Dwight Hillis, Jacob Riis, Judge Ben B. Lindsey, Booker T. Washington, Dr. Victor C. Vaughan, Dr. S. Adolphus Knopf, Dr. C. B. Davenport, Dr. J. N. Hurty, the Very Reverend (Dean) Walter Taylor Sumner and many others of equal prominence.

Open Air Schools.

Those interested in the administration of anti-tuberculosis work, and those confronted with the responsibilities of public school management, will find much of interest and profit in a recent Sage Foundation bulletin,—"Open Air Schools." The little pamphlet is of sixteen pages; points out the need for this special provision for delicate children; traces the growth of the movement, and emphasizes the fundamental necessities. It is liberally illustrated and should prove useful where a

briefier stimulus is desired than Doctor Ayres' fuller treatment of the subject in his book of the same title. The pamphlet may be obtained for ten cents from the Division of Education, Russell Sage Foundation, 130 East 2d Street, New York City.

Cleaning up Guayaquil.

"The Ecuadorean government has approved the contract with a London firm for the sanitation of Guayaquil. The question of cleaning up Guayaquil has been under consideration for a long time. Bubonic plague and yellow fever have been prevalent there, and the proper sanitation of the port was made the subject of an investigation by Col. William C. Gorgas, head of the sanitary work in the Panama Canal Zone. The installation of a proper sanitary system has been made imperative by the early opening of the Panama Canal. It is understood that the cost of the work will approximate \$10,000,000."

Science, January 9, 1914.

Report Disease.

"A physician stated in our presence, not six months ago, that he would not report contagious diseases, that he did not believe there was any law compelling him to do so, and he, therefore, served notice upon the commissioner of health that in the future the department need expect no assistance from him in such work. The commissioner of health enjoys a good, sharp, legitimate scrap probably as well as most men. However, it seems to us that in failing to report contagious diseases a physician at once renders himself most blameworthy, untrustworthy, despicable and dangerous. He at once becomes a danger, not only to the family, but to the city as well. A man, who refuses to report a case of contagion and thus exposes one single person unnecessarily to a fatal disease, is not worthy of the regard of any decent, self-respecting man. A physician who will countenance the concealment of a contagious disease at the request of those who are employing him is not true to his profession and is untrue, as a matter of fact, to the people who are employing him. Such a one in any city is a moral leper, going up and down our streets countenanc-

ing cruel death to your children, to your friends and to all innocent men and women.

"The abortionist is despised utterly by the women upon whom he performs an illegitimate operation when there is not sufficient reason to justify the act. The man who hides fatal disease at the request of a woman or a man is, as a matter of fact, as despicable, as dishonorable, as mean and tricky as is the abortionist, that most abject and horrible of all God's creatures.

"A man clothed with the magnificent garb of the medical profession, saying to the constituted health authorities that he will not longer protect human life, that so far as he be concerned he will allow contagion to stalk through your city, deserves your contempt and should be abhorred by every right-thinking man and woman in Seattle.

"In our department we have endeavored to be fair and just to the physician who, on account of fatigue and unusual hard work, has forgotten to send in the cases of contagion which have occurred in his practice, and only once have we found it necessary to make an arrest of a physician in this city for failing to report, and this was an instance so flagrant and which resulted so disastrously (inasmuch as death occurred) that we were forced to take action. We believe we are fair to the physicians in this city from whom in return we have received splendid support. It is a crime and disgrace for any physician to so far forget himself, to so far forget what his duty is to his profession, and also to so far forget his duty to the family by whom he is employed and to the immediate neighborhood and to the public at large as to wilfully refuse to comply with the very reasonable terms of the laws of this city and state. Such a physician should not imagine for one moment that he gains by such actions, be-

cause every man and woman in Seattle knows that if their family physician will be dishonorable in this he will be dishonorable in every other act of life. What can be more important and more necessary than the saving of human life, by reporting contagious diseases that their spread may be stopped without a moment's loss.

"Let me say to every person who will read this bulletin (and there will be 65,000 people in this city likely to see this article) that, if a physician in your employ refuses to obey the law so plainly stated and so uniformly lived up to by almost every physician in this community, he commits an unpardonable sin. Remember that if he conceals a case of contagious sickness, at your request, that the next day he may conceal a case of smallpox, diphtheria, scarlet fever or of plague in the next home to yours. Please think now that your little children, playing in the yard adjoining your neighbor, may receive that poison from a case which has been concealed in your neighbor's house which will destroy their lives and render your home bleak and barren of all future pleasures and peace. Think of a man unskilled in medicine who would voluntarily expose a child to a fatal disease; then think of the unspeakable physician, so utterly degenerate in every way that he will refuse so far as it lies within his power to report promptly all his contagious diseases that we may attempt to save those little lives which are so dear to you; which mean so much in your home; which mean so much in the community, among your friends and neighbors,—yes, which mean so much even in the great city of Seattle.

Bulletin of the Seattle School of Sanitary Science.

COMMUNICATIONS.

January 11, 1914.

The Editor, The American Journal of Public Health:

SIR—In the October number there appears a most interesting paper from the pen of Prof. William T. Sedgwick, entitled "Reappearance of the Ghosts of Malthus."

One can not read this paper without being impressed with the rapidity with which our country is becoming overpopulated or, rather, the rapidity with which we are becoming dependent upon other nations for our food supply. Less than twenty years ago the Federal government conducted

throughout Europe a campaign to introduce our corn products, but by a recent issue of the daily papers we learn that today we are importing large quantities of corn from Argentine.

It has been said that by 1950, at the present rate, our country will not produce sufficient food for the people. This being the case, it seems that every effort should be made to increase the productiveness of the soil. Much is being accomplished by the rotation of crops and the better utilization of fertilizers, but still we are falling behind.

To me one of the greatest national wastes is in our crude methods of disposal of human excrement.

The case may be put this way. An acre of ground produces a certain quantity of food products. These are utilized by some person or persons, but instead of returning their waste products to the soil they are thrown into a sewer, where to all intents and purposes they are lost forever.

Just what is the fertilizer value of human excrement I do not know, but observations of Chinese and Japanese gardens in Oriental lands leads one to believe that the value is high. While I would not advocate the utilization of human excrement after the crude methods used in the Orient, I would suggest that an investigation of the utility and the fertilizer values of human excrement might be a most profitable subject for some student of agriculture and sanitary science.

I am well aware of the dangers of throwing raw feces on the ground. One who went through the terrible typhoid epidemic in our army in 1898 and who has seen more than one cholera epidemic does not have to be reminded of that danger. Yet I am fully convinced that we can devise a method for the utilization of feces and at the same time eliminate these dangers.

Studies of the life histories of the typhoid and dysentery bacilli in the soil have given such varying results that it seems that the whole subject should be studied anew, not from an academic, but from a practical, point of view, for the purpose of determining a method of disposal and storage which will

insure the death of these germs, and at the same time will not be too costly.

The water carriage system is so convenient and easy of operation that very few have ever asked themselves the question: "Is it possible to devise another system that will do as well?" However, a hundred years of sewers have resulted in the pollution of nearly every stream, lake and pond in our country. Ruskin has put it clearly when he says: "Waters which a Pagan would have worshiped in their purity, and you have only worshiped in their pollution."

The water system is very expensive. At great expense a city purifies its water supply to be used to wash contaminated feces back into the water supply of some other city. The flushing of closets uses no small part of the water supply used by a city.

Our sanitary officials do not consider the cost of these things when they recommend public improvements. They forget that if in their endeavors to improve the health of a community they are impoverishing the land and taxing the people too much they are creating the very conditions that they strive to eliminate.

The time will come when for a city to have a sewer carrying fecal matter will be a disgrace.

Yours very truly,

ISAAC W. BREWER, M. D.

January 14, 1914.

Secretary, American Public Health Association:

SIR—I have the honour to inform you that at the Annual General Meeting of the Canadian Public Health Association held in Regina on the 18th of September last, the following resolution was unanimously carried:

"That the Standard laboratory methods of the American Health Association be adopted as the Standard of the Canadian Public Health Association."

And that a copy of this resolution be forwarded to the secretary of the Association.

I am, Sir, yours sincerely,

LORNE DRUM,

General Secretary.

CURRENT PUBLIC HEALTH LITERATURE

AMERICAN

Boston Medical and Surgical Journal

CLXIX, No. 26. Dec. 25, 1913

Medical and Social Aspects of Mental Disease Due to Alcohol: Notes of Conference Held at Psychopathic Hospital, Boston, before Legislative Commission on Drunkenness, Nov. 24, 1913.

Work of Massachusetts Legislative Commission on Drunkenness, 1913. M. J. Murry, Boston.

Report of Clinical Demonstration of Alcoholic Mental Diseases, with Remarks on Current Practice at Psychopathic Hospital, Boston. H. M. Adler, Boston.

Consensual Amyosis to Blue Light as Shown in Alcoholic Cases. G. E. Eversole, Boston.

After-Care and Moral Suasion Work with Alcoholics in Out-patient Department of Psychopathic Hospital. A. W. Stearns and M. C. Jarrett, Boston.

Institutional Requirements for Acute Alcoholic Mental Disease in Metropolitan District of Massachusetts in Light of Experiences at Psychopathic Hospital. E. E. Southard, Boston.

Alcoholic Amentia. A. W. Stearns, Boston.

CLXX, No. 1. Jan. 1

Carbon Monoxide Poisoning. W. H. Robey, Boston.

CLXX, No. 2. Jan. 8

Simple and Effective Method for Disinfection of Typhoid Stools. H. Linenthal and H. N. Jones, Boston.

Engineering Record, New York

LXIX, No. 1. Jan. 3

Progress in Water Supply. Allen Hazen. Advances in Sewage Disposal. George W. Fuller.

Refuse Disposal and Street Cleaning. Samuel A. Greeley.

LXIX, No. 2. Jan. 10

Emergency Handling of Garbage in Chicago.

LXIX, No. 3. Jan. 17

Relation of Bleach Application to Typhoid Rates.

Factory Lighting. G. H. Stickney.

LXIX, No. 4. Jan. 24

Paths of Sewage Currents in New York Bay Tested.

Proposed Refuse-Disposal Plant at Trenton.

Journal of the American Medical Association, Chicago, Ill.

LXII, No. 1. Jan. 3, 1914

Pellagra: A summary of the First Progress Report of the Thompson-McFadden Pellagra Commission. J. F. Siler, P. E. Garrison and W. J. MacNeal, New York.

Experimental Studies in Poliomyelitis. Phebe L. Dubois, Josephine B. Neal and A. Zingher, New York.

A Rapid Method of Isolating Pathogenic Streptococci from Contaminated Fields. Louis L. Ten Broeck, Minneapolis.

An Improved Diphtheria Culture Tube. C. C. Bass, New Orleans.

LXII, No. 2. Jan. 10

Infant Mortality in the First Four Weeks of Life. Henry Koplik, New York.

An Epidemic of Smallpox in Sonora, Mexico. Lloyd Mills, Los Angeles.

Universal Circumcision as a Sanitary Measure. A. L. Walbarst, New York.

Field Work in Tuberculosis. Mary E. Lapham, Highlands, N. C.

XLII, No. 3. Jan. 17

The House-Fly and Diarrhoeal Disease among Children. Donald B. Armstrong, New York. The Effects of Nitroglycerin on Those Engaged in Its Manufacture. George E. Ebricht, San Francisco.

Clinical Report of a Case of Rabies Treated with Neosalvarsan and Quinine, Together with a Case of Lyssaphbia. B. Wesson, El Paso, Texas.

Leprosy After Two-year Incubation Period. Victor G. Heiser, Manila, P. I.

XLII, No. 4. Jan. 24

Architecture of the Modern Hospital for Contagious Diseases. L. A. Lamoreaux, Minneapolis.

The Plague Outbreak in Porto Rico. S. B. Grubbs, Providence, R. I.

Brazier's Disease, Brass Founder's Ague, or Acute Brass Poisoning. Charles A. Pfender, Washington, D. C.

Journal of Experimental Medicine, New York

XIX, No. 1. Jan. 1

Observations on the Growth of Bacteria on Media Containing Various Anilin Dyes. Charles Krumweide, Jr., and Josephine S. Pratt.

Acid Agglutination of Pneumococci. L. J. Gillespie.

An Immunological Study of Pneumococcus mucosus. Frederick M. Hanes.

Journal of Medical Research, Boston

XXIX, No. 2. Dec., 1913

Specific Paratuberculous Enteritis of Cattle in America. K. F. Meyer, Philadelphia.

Bacillus Aerogenes Capsulatus in Epidemic or Dysentery and in Normal. S. T. Orton, Boston.

Etiology of Epizootic Abortion in Mares. K. F. Meyer and F. Boerner, Philadelphia.

Military Surgeon, Washington

XXXIII, No. 6. Dec., 1913

Malta Fever in United States. C. E. Yount, U. S. A.

Northwest Medicine, Seattle

V, No. 12. Dec. 1913

Public Health Laboratory and Its Relation to Physician, Health Officer and Public. B. L. Arms, Portland, Ore.

Pennsylvania Medical Journal, Athens

XVII, No. 3. Dec. 1913

Commission of Conservation of Vision: Report of Chairman. W. C. Posey, Philadelphia.

Philippine Journal of Science, Manila

VIII, No. 5. Oct., 1913

Experimental Balantidiasis. E. L. Walker, Manila.

Acute Malignant Glanders in Man. W. E. Musgrave and A. G. Sison, Manila.

Varicellid in Manila. P. M. Ashburn, E. B. Vedder and E. R. Gentry, Manila.

Public Health Reports

XXIX, No. 1. Jan. 2

- Malarial Fevers, Prevalence and Geographical Distribution in Arkansas. R. H. von Ezdorf, P. H. S.
 The Full-Time Health Officer. Louis I. Dublin.
 Morbidity Reports. Practice in Minnesota in Cases Extra-State in Origin.
 Leprosy. Treatment of Two Cases with Apparent Cure. Victor G. Heiser, P. H. S.

XXIX, No. 2. Jan. 9

- The Wilmington (N. C.) Water Supply. Earle B. Phelps, P. H. S.
 Experimental Insect Transmission of Anthrax. M. Bruin Mitzmain.

XXIX, No. 3. Jan. 16

- Prevalence of Communicable Diseases. Diphtheria, Measles, Poliomyelitis, Rocky Moun-

tain Spotted (or tick) Fever, Scarlet Fever, Septic Sore Throat, Tuberculosis, Typhoid Fever, Typhus Fever and Smallpox. Cases Reported, Case Rates Per Thousand Population and Fatality Rates Per Hundred Cases. During the Year 1912 and the First Six Months of 1913, in Certain States.
 Biological Products. Establishments Licensed for the Propagation and Sale of Viruses, Serums, Toxins and Analogous Products.

XXIX, No. 4. Jan. 23

- Plague in Russia. (Translation.) W. C. Rucker.
 Smallpox in Germany. Emily R. Jones.
 Malaria. The Use of Trypsin and Amylopsin in its Treatment. Abstract.
 Tuberculosis. Notification of Cases in California.
 Mental Hygiene. E. H. Mullan.

FOREIGN

Archiv für Soziale Hygiene und Demographie

IX Band, 1 Heft. Dec. 4, 1913

- The Organization of Morbidity Statistics in Russia. E. Roesle.

Centralblatt für Bakteriologie, Abt.: I, Orig.

Bd. 72. Heft 45

- Schistosomiasis japonica. Dr. Katsurada.
 The Morphology and Biology of the Anthrax Bacillus in the Animal Body. A. D. Woloschin.
 Yeasts and Molds in Localized Pneumonia in Domestic Animals and Pulmonary Trichophytosis of the Lung in Calves. Paul Serena.

Deutsche Vierteljahrsschrift für Öffentliche Gesundheitspflege

45 Bd. 4th issue, 1st half

- The Necessary Housing Conditions for German City Inhabitants. J. Kaup.
 The Social Hygienic Conditions in Germany after the Official Promulgations of 1912. Alfons Fischer.
 The Milk Supply of the Larger Cities with Special Reference to the Conditions in Hamburg. Richard Drews.
 Industrial Hygiene in Rumania, especially in Bukarest, during 1910. N. Burghel.
 XIII Yearly Meeting of the German Association for School Hygiene.

Hygienische Rundschau, Berlin

XXIV, Jahrgang No. 1. Jan. 1

- The Subject of Disinfection at the Annual Meeting of the German Public Health Association, at Aachen, 1913.

Indian Journal of Medical Research, Calcutta

I, No. 2. Oct., 1913

- The Protection of India from Yellow Fever. S. P. James.
 Note on the Practicability of Stegomyia Reduction in Indian Seaports. S. P. James.
 The Bactericidal Action of Organic Silver Salts and other Antiseptics on the Dysentery Bacillus. L. Rogers.
 The Cultivation of the Comma Bacillus from the Lung in a Case of Cholera. E. D. W. Grieg.
 The Precipitation of Bacterial Protein by Concentrated Salt Solution and its Relation to the Bacteriological Diagnosis of Cholera. E. D. W. Grieg.

- The Working of the Cholera Prevention Scheme on the Lower Ganges Bridge Construction. T. H. Bishop.
 The Probable Ratio of Relapses and Fresh Infections to the Total Attacks of Malarial Fever and a Discussion of Quinine Dosage. A. C. MacGilchrist.

Journal of the Royal Sanitary Institute, London

XXXIV, No. 12. Jan., 1914

- Financial Aspect of the Housing of the Working Classes. Henry R. Aldridge.
 The Development of New Housing Areas on Town Planning Lines. John H. Barlow.
 The Provision of Cottages in Rural Districts. Miss A. Churston.
 The Housing Question. (A Sanitary Problem.) Reginald Brown.
 The Control of Indiscriminate Spitting. D. M. Mathieson.

Journal of State Medicine, London

XXII, No. 1. Jan. 1914

- Fustian Cutting and Health. John Fortune.
 Sporotrichosis, Continued. Dr. Gougerot.
 Some Impressions of Eighteen Months' Experience of Work under Sections 15, 17 and 18 of Housing, Town Planning Act, 1909. James Dundas.
 Disposal of Refuse in Camps. Dr. Rouget.

Medical Officer, London

XI, No. 1. Jan. 3

- Deformities and Malformations in School Children. E. Bertram Smith.

XI, No. 2. Jan. 10

- The Municipality and Cancer. A. Mearns Fraser.
 Provision of Meals for School Children and the Prevention of Tuberculosis. A. A. Auden.

XI, No. 3. Jan. 17

- Dr. Dury v. Officers of the National Anti-Vaccination League.
 Some Points for Consideration in the Diagnosis of Mental Defect. George A. Auden.

Public Health, London

XXVII, No. 4. Jan., 1914

- Some Observations on the Employment of School Children Outside School Hours. E. D. Parsons.
 Employment of Married Women in Factories. H. H. I. Hitchon.
 The Sale of Milk. Joseph Cates.
 The Utility of Open Air Shelters in the Modern Anti-Tuberculosis Campaign. Adam White.
 Notes on an Interesting Milk Prosecution.

AMERICAN JOURNAL OF PUBLIC HEALTH

OCCUPATIONAL DISEASES AND LEGIS- LATIVE REMEDIES.

JOHN B. ANDREWS,

Secretary American Association for Labor Legislation, New York City.

Read before the Sessions American Public Health Association, Colorado Springs, September, 1913.

A remarkable development of popular interest in the study of occupational diseases has come about during the past three years.

The First National Conference on Industrial Diseases, in June, 1910, called popular attention to this subject as a new problem. The question then most frequently asked was "*What are occupational diseases?*"

Of course there were common trade maladies then familiar to most physicians and to those engaged in the respective employments. Such popular terms as "lead colic," "miners' asthma," "hatters' shakes," "potters' rot," "boiler makers' deafness," "brass workers' chills," and the compressed-air workers' "bends," are merely suggestive. But we now know that practically every calling contributes its own special malady to the long list of work diseases.

The "Memorial," prepared by a committee of that first conference in 1910, laid a foundation for national investigation, and fifteen states have already passed laws providing for systematic reporting of occupational diseases by physicians. The work of the one state commission led to the enactment of the Illinois law requiring monthly medical examination of the workers in several industries where poisonous substances are used. Similar laws have been secured this year in Missouri, Ohio and Pennsylvania. Moreover, the United States Congress finally passed, in April, 1912, the anti-phosphorus match law which abolishes one disease, the match workers' "phossy jaw." Another bill, now before Congress, is designed to replace the present law providing inadequate compensation for accidental injuries to certain employees of the Federal government, and to extend the compensation principle to embrace also the victims of occupational diseases.

Medical inspection of factories, too, has come to be recognized as important, and Illinois, Massachusetts and New York have developed a state service for such systematic medical inspection of work places.

The Second National Conference on Industrial Diseases, in June, 1912, led to the public discussion of industrial hygiene by physicians, physiologists, factory inspectors, manufacturers, efficiency engineers, trade unionists, sociologists and lawyers. Through the medium of a joint session of the Association for Labor Legislation and the American Medical Association a valuable symposium on industrial diseases was prepared and published, together with a critical bibliography of fifty printed pages. In the latter undertaking the coöperation of the Library of Congress and the federal Bureau of Labor was secured.

The Medical Association, the Chemical Society, the Association for Labor Legislation and the Society for the Conservation of Vision are among the private organizations that have appointed committees to undertake special investigations. Three Federal bureaus are now studying the question in their own respective fields, and several state commissions, bureaus of factory inspection and boards of health are at work upon the problem.

NATURE OF THE PROBLEM.

The first occupational diseases to receive special attention in this country are naturally those which are most easily recognized and which offer reasonable hope of their elimination. A few typical illustrations very briefly stated will be sufficient to indicate this fact.

Phosphorus poisoning, which occurs principally in the match industry, is so clearly defined in character, so loathsome in nature, and so totally unnecessary on account of inexpensive and harmless substitutes, that absolute prohibition was practicable. Even though it was necessary in this instance to use for the first time for such a purpose the taxing power of the Federal government, the public, when finally informed concerning the horrors of "phossy jaw," demanded that it be wiped off the list of diseases.

Lead poisoning is the most prevalent of all occupational poisonings today and Dr. Alice Hamilton is doing excellent work on that subject.

Compressed air illness, with the increasing amount of caisson work in the building of bridges, tunnels, subways and skyscrapers, has made familiar the trade disease commonly called "the bends." It would be difficult to conceive of a disease more clearly occupational in origin, and it seems scarcely possible that we will ever have at hand a remedy more strikingly scientific in form. In fact, the adoption of a regulation as simple as the multiplication table, if rigidly enforced, is sufficient to eliminate practically all danger of "the bends."

Closely following these prominent illustrations will, of course, be added the occupational maladies caused by the anthrax bacillus, and by a long list of industrial poisons, including arsenic, brass, mercury, and wood alcohol. Then, when the occupational skin diseases and eye diseases have been studied, we may expect that more attention will be given to trade diseases of the nervous system, and so on until the field is covered.

Because more easily recognized, the striking manifestations of these diseases are first to receive popular attention. But these spectacular effects of occupational disease are trivial compared with the gradual lowering of vitality caused by the daily breathing of impure air and by continual overstrain. The public should know that occupational diseases referred to in such popular terms as "phossy jaw," "painters' colic" and "the bends," scarcely begin to indicate the disastrous effects of unhealthful conditions of employment.

The principal health risks in industry, as far as we now know them, may be conveniently classified according to their nature as follows:

- (1) Specific industrial dusts, fumes, gases, vapors and acids (poisonous and non-poisonous);
- (2) Harmful bacteria and micro-organisms;
- (3) Compressed or rarefied atmospheres;
- (4) Improper lighting;
- (5) Extremes of temperature;
- (6) Excessive strain.

In what industries are these disease hazards most prevalent? How many workers are affected by them? How many die? Are conditions improving or growing worse? Is occupational disease necessary to our civilization or can it be completely abolished? On all of these questions our information, until recently, has been almost *nil*.

At present we have but few real records. The whole problem of education, factory sanitation and legislation upon this topic is halted, and workers unnumbered are smitten with trade diseases yearly, all for the want of a little fundamental information.

EXTENT OF THE PROBLEM.

The extent of the occupational disease problem is scarcely yet appreciated in any quarter.

If we consider merely those diseases due to industrial poisons, we find already prepared a carefully analyzed list of fifty-five, one of which alone (lead) is in daily use in more than 150 trades.

The first state medical inspection of factories in Illinois resulted in the removal from a single establishment of sixty workmen who had become "leaded."

The medical director for the Pennsylvania East River Tunnels, in 1909, reported 3,692 cases of compressed air illness, twenty of them fatal.

The Ohio *Accident* Commission, after careful study, declared that 75 per cent. of industrial injuries reported to it by trade unions should have been classified as occupational diseases.

Careful American authorities count our industrially employed in the United States as 33,000,000, and estimate that, from sickness alone, our mere money loss each year is nearly three quarters of a billion dollars. These experts further declare, on the basis of German experience—"we have no corresponding data for this country"—that one fourth of this annual economic loss (approximately \$200,000,000) can be prevented, if we insist.

PREVENTION OF OCCUPATIONAL DISEASES.

The prevention of occupational diseases is too great an undertaking to be left entirely to individual action. It cannot be left to the worker, who, even when not ignorant of the danger, is driven by necessity to his task. It cannot be entrusted to the employer whose principal business after all, under competitive conditions, is to secure profits. It cannot be left to medical treatment alone, for prevention and not after care is the remedy. Not only on account of the magnitude of the problem, but also because of its nature, *the prevention of occupational diseases is properly a function of government.*

Every person in the community is concerned in the conservation of the health, vitality, energy, and industrial efficiency of wage earners. All agencies in society should coöperate in preventing unnecessary suffering and death among the producing classes. The protection of the health of the industrial worker is not an individual question. It is a social question demanding social regulation.

Governmental action, however, in promoting industrial hygiene does not mean that private or voluntary efforts of the workmen, or of their employers, or of their physicians, shall be in any way minimized. On the contrary such voluntary efforts will be vastly encouraged.

It must be obvious to any thoughtful person that, in preventing unnecessary occupational diseases, we must have investigation, education and administration. These three requisites can in a democracy best be secured through legislation. It is only through the uniformity of regulation which legal enactments alone can secure, that the more progressive and humane employers can themselves be protected from less scrupulous competitors who would otherwise often fail to provide expensive safeguards. And it is only through compulsory regulations that the health of the employees of these unscrupulous competitors can be protected.

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LEGISLATIVE REMEDIES.

The final legislative remedies for the prevention of occupational diseases are of three classes. First the method of prohibition, second the method of regulation, and third the method of compensation or insurance.

The method of prohibition may be applied in two ways. It may be used to exclude from hazardous employments those most susceptible to the dangers, as is done in a few states, in a long list of occupations from which young people or women are barred. Medical examination of applicants for jobs in the lead trades and in compressed air work is a more recent extension of this idea to protect adult men. Secondly, the method of prohibition may be used to outlaw dangerous conditions or substances as already illustrated by the poisonous match legislation.

The method of regulation, in the prevention of occupational diseases as in other social problems, is based on the principle of toleration within limits. The majority of the people may believe that certain harmful conditions are so necessary a part of our industrial life that their prohibition is at present undesirable or, at least, impractical. In dealing with the social evil the adoption of this principle leads to segregation. In dealing with occupational diseases it leads in the work *places* to the installation of exhaust fans, wet processes, vacuum cleaning, separate wash rooms and eating rooms; and for the work *people* to the limitation of working hours.

The method of insurance or compensation is based on the principle that those individual misfortunes which cannot be prevented, either by prohibition or regulation, can best be borne by the community.

The expense of broken machines is borne by the industry, which passes the burden on to society. In recent years we have come to insist that so also should be borne the financial expense of broken legs and arms. The next step must be the extension of the same principle to include incapacity due to arms paralyzed by lead poisoning or incapacity due to other diseases of occupation.

CONCLUSION.

At a time when the health of the nation receives thoughtful attention, and sociologists, lawyers and physicians vie with one another in pressing upon Congress the need of legislation, the effects of industries upon health call for thoughtful study.

When we get down to business in the attempt to standardize occupations, we begin to realize how much of the modern labor problem is a health problem. Gradually, and surely, but almost without realizing it, we have passed within the last fifteen years into a new period of American history. The courts are beginning to get a new perspective on life. Century-old precedents based on individualism are trembling in the balance. Here and there a judge shows clearly that he has been studying economics as well as

law. Recent court decisions clearly indicate that protective labor legislation will be sustained as a legitimate exercise of the police power when it is made apparent that conditions justify such interference on the grounds of health.

Only through careful study can we secure accurate information which will finally enable us to establish scientific standards. The establishment of such standards is prerequisite to intelligent legislation, to enlightened court opinions, and to efficient enforcement of the law.

While such researches are under way, we should emphasize at every opportunity the following considerations: (1) all preventable occupational diseases must be prevented; (2) those occupational diseases which we do not yet know how to prevent must be reduced to a minimum; and (3) the victims of occupational disease must be compensated for their injuries by some just system of insurance.

AN INVESTIGATION INTO THE RELATIONSHIP OF THE HOUSE FLY TO DISEASE—THE SPECIAL IMPORTANCE OF THE FLY IN INFANT WELFARE.

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INTRODUCTION.

Many studies have been made in an effort to ascertain the exact facts bearing upon the importance of the house fly as a transmitter of disease. The popular campaign against the house fly, whether well founded or not, has become in this country during the fly season well-nigh universal. It is an interesting fact that, although we have campaigned against the insect regardless of climate or environmental conditions, nearly all of the responsible and scientifically accurate field *research* into this question has been carried on in the South.

There are two diseases concerning which the evidence against the house fly seems to be decidedly incriminating. These two diseases are typhoid fever and the diarrhoeal disease of infancy. In the matter of typhoid fever, Dr. Terry, health officer of Jacksonville, Fla., has greatly reduced the death-rate by cleaning up vacant lots, by screening privies and outside toilets and by other methods directed not only toward the elimination of fly-breeding nuisances, but also toward the destruction of fly-infecting nuisances. The contrast to Jacksonville and other southern communities, which northern cities make by the comparative absence of privies, vacant-lot contamination, etc., makes it likely that this method of transmission of typhoid fever is comparatively rare in these better sanitated communities.

The case against "The Fly that Does not Wipe Its Feet" in the diarrhoeal disease accusation is somewhat different. Here again, another southern city, Richmond, Va., under the direction of Doctor Levy, has demonstrated beyond doubt that the fly is of importance, under *southern conditions*, in the transmission of this disease.

THE PROBLEM.

The Bureau of Public Health and Hygiene, working under the endowment of Mrs. Elizabeth Milbank Anderson, was urged to initiate in New York City a widespread campaign against the house fly. It seemed, however, that

there had been determined, for northern communities, scarcely sufficient facts upon which one could justifiably base an extensive and expensive campaign. The question of typhoid had been considered by other investigators. The problem of diarrhoeal disease transmission had never been thoroughly studied in any northern community and it was decided that an investigation be made in which all morbidity and mortality would be accounted for, in which special attention would be paid, of course, to the diseases frequently accredited to the fly and in which particular attention would be given to the significance of the fly in diarrhoeal disease.

Such a study was instituted by the Bureau during the last summer (1913). The work at the present time is by no means complete nor has the investigation been carried far enough to justify the announcement of scientifically authenticated facts. The first step of the research has been completed, however, and it is upon the results so far that we wish to report.

THE PLAN.

The general plan of the research, broadly stated, was to select an area in the city presenting as nearly as possible uniform conditions throughout. In this area, two sections, nearby but not adjacent, were to be further selected, one of which was to be allowed to remain in its accustomed state, while upon the other it was the intention to concentrate in an effort to eliminate the house fly and particularly to protect infants from the insect. A careful census was to be made of the population of the two areas according to age groups, a careful record made of the amount of sickness in the two blocks at the beginning of the inspection period and a thorough medical inspection given the two areas weekly for a series of weeks, during which time all cases of morbidity and mortality with facts relating thereto, was to be recorded. Several sections of the city were considered and the district finally selected was in the southwestern part of the Bronx Borough. This is an area inhabited solidly by Italians, characterized by high infant mortality rates and boasting all the equipment necessary for the lively perpetuation and joyful existence of the house fly. The two sections selected for study were comparable in every respect so far as could be discovered. The actual boundaries of the protected district were Park Avenue and Morris Avenue, 150th and 151st Streets.

THE CENSUS.

The method of taking the census was the same in both sections. The family was taken as a unit and an envelope prepared for each family on the outside of which were recorded the age and occupation of all actual members of the family and of others living in the same apartment. In this envelope were filed weekly the inspection cards made out each week by the visiting nurses and containing all valuable information as to the type

and duration of any diseases occurring among the individuals in the family.

A statistical summary of the census will be found in Tables I and II.

TABLE I.

The Total Number of Families and Individuals in the Two Sections.

<i>Protected Area.</i>		<i>Outside Families.</i>	
Families.....	311	Families.....	311
Individuals.....	1,725	Individuals.....	1,744

TABLE II.

Population by Age Groups.

	<i>Protected Area.</i>	<i>Outside Families.</i>
Under 1 year.....	100	98
Under 2 years.....	175	160
1 to 5.....	262	298
5 to 15.....	296	390
15 to 30.....	552	423
30 to 50.....	440	419
Over 50.....	75	117

The educational work, which was carried on in the protected area during this preliminary census period, was directed solely against the dangers of the house fly in the transmission of disease and particular emphasis was placed upon the supposed importance of the insect in the diarrhœal diseases of children. This limitation in scope is true for all of the educational work done in the section throughout the whole experiment. From time to time *inquiries* were made into the conditions prevailing as regards other important factors in infant welfare, such as milk supply, type of nursing, etc. In these instances, however, advice and recommendations were not given to the mothers and the normal state of affairs so far as possible, was left unaltered.

The actual period of weekly medical inspection lasted for eight weeks, from July 21 until September 13.

ANTI-FLY METHODS.

The methods adopted to oppose the fly were many. Since the children spent the greater part of their time in the houses, every effort was made to keep the flies out of the apartments and to make it as unattractive as possible when they did get in. The attempt to starve the insect, supplementing similar work indoors, was carried on outside in addition to methods aimed at the trapping of the disease carrier. It avails little, however, to starve, swat and trap the house fly unless at the same time every effort is made to interfere with its breeding. This was also done during the experiment and will be referred to, together with other methods employed, in the following outline:

1. Educational Campaign.

Each home in the protected section was visited frequently by the local superintendent, by nurses employed by the bureau and a nurse generously donated for the purpose by the Division of Child Hygiene of the Health Department. Very thorough instruction was given the mothers and the effect of this work was supplemented by the distribution at frequent intervals of literature in Italian and English describing and depicting house-fly dangers. A valuable supplement to this educational work was the exhibition at a local moving picture theatre at every run for a week of the film on the house fly, loaned for the purpose by the Fly Fighting Committee of the American Civic Association. Free tickets admitting all but very small children were distributed in the block and of the eight hundred of those given out, nearly seven hundred were taken in at the ticket office.

2. Screening.

Screens were placed in every window and door in the block, about seventeen hundred openings in all. The people were instructed concerning the desirability of keeping the screens closed and of protecting them from injury and destruction. It was found, however, that during the warm weather it was practically impossible to keep the screens either in or closed. Not only were they taken out, but they were torn out, and in some cases destroyed. Owing to failure of this part of the program, it is felt that the screening was a very small factor in the anti-fly work, and that so far as this experiment goes it was of small importance compared with the educational and other efforts in determining the results.

3. Fly Trapping.

With the aid of the local Boy Scout organization, large traps were constructed and placed in the courtways, yards, and stables in or adjacent to the district. These were baited and emptied regularly by Boy Scouts under the direction of the local superintendent. Thousands of flies were caught in this manner, many of which were transferred to the Museum of Natural History, where, through the coöperation of the Department of Public Health, a determination was made of the types of flies caught. It is particularly interesting to note, because of its supposed importance in the transmission of infantile paralysis, that about 1 per cent. of the flies were *Stomoxys calcitrans* (stable fly), while the others were mostly house flies, with a sprinkling of flesh flies, blue-bottle flies, etc.

At the same time, numbers of living flies were caught in the houses, and with the coöperation of the health department laboratories, were taken to the laboratories and their surface washings plated in the ordinary way for the purpose of making bacteriological counts. Some of these flies were

caught in homes of the protected area and others were captured in the uncleaned houses. Not only was the total number of bacteria counted, but plates were made on the Conradi-Drigalski medium. The results of these experiments are given in Tables III and IV.

TABLE III.

Bacterial Count of Flies.

From Clean Houses.

<i>Specimen No.</i>	<i>Agar at 37° C.</i>	<i>Conradi Plates.</i>
186.....	12,000	1,500
32.....	1,500	2,000
209.....	3,100	2,000
1.....	1,000	375
575.....	600	250
*66.....	75,000	24,000
*1316.....	4,200	1,300
Average.....	13,986	4,489

TABLE IV.

Bacterial Count of Flies.

From Dirty Houses.

<i>Specimen No.</i>	<i>Agar at 37° C.</i>	<i>Conradi Plates.</i>
893.....	5,000	2,300
365.....	2,050,000	600,000
392.....	1,050	125
*835.....	4,000,000	900,000
*573.....	575,000	250,000
*688.....	4,050	275
Average.....	1,106,017	292,117

It will be noticed that on both the Agar and Conradi plates the highest counts were found on those flies caught in homes in which there were cases of diarrhoeal disease. These figures would have to be repeated many times before a convincing average could be struck, but they are suggestive as far as they go and, indeed, are indicative of what one would expect to find under these conditions. The flies in a filthy section have greater opportunities for bacterial contamination than those in a clean area. This is particularly true of the bacteria which would be likely to have their origin in voided intestinal contents.

4. Fly Swatting, etc.

The nurses distributed to each of the homes fly swatters and a weekly supply of fly paper, generously contributed for the experiment. The moth-

*Diarrhoeal disease in the home.

ers were educated to see that the fly paper captured the flies and not the babies, and were encouraged in the use of these materials.

5. Disinfection of Breeding Places.

For the purpose of destroying breeding places, the bureau had sent to all the stables in the district sufficient quantities of iron sulphate to insure the efficient disinfection of the manure throughout the experiment. Through experiments carried on at the Museum of Natural History, it was discovered that this material could be used in stables effectively at the slight cost of nine mills per horse per day. Some of the disinfectant was used regularly in the several outside toilets in the district. It was soon discovered that the stablemen could not be depended upon to use the material effectively or intelligently, and consequently a man was detailed to see that the disinfectant was mixed and applied daily.

6. Clean Streets.

With the assistance of a special inspector assigned to the district by the Department of Street Cleaning, it was possible to maintain the streets in a decent, healthful condition.

7. Clean Tenements.

The Tenement House Department assigned an inspector to the section and greatly aided the bureau in its efforts to maintain cleanliness inside the houses, to encourage the use of garbage cans supplied with lids and to prohibit the throwing of garbage and other refuse out of the windows and into the courtyards. The result of the educational work in this direction was quite remarkable, cleaned-up courtways, new garbage cans, etc., being strikingly in evidence.

8. Clean Courtways, Yards and Stables.

The Sanitary Division of the Health Department was requested to give special attention to the section. By the coöperation of the bureau with the sanitary inspector, it was possible to bring about a general cleaning-up of accumulated refuse in the district.

During the whole experiment the nurses were busy visiting each home weekly and making a careful record of all morbidity and mortality, at the same time recording in special tabulations, sickness and deaths among the infants and children. The results of this work will be presented in tabular form and discussed later on.

FIELD RESULTS.

As to the actual results of the experiment, it may be well, before presenting the statistics derived from the investigation, to give a few general conclusions based on observations made in the field at the time of the work.

The experiment showed the perfect ease with which it is possible to greatly improve the sanitary condition of a district. It was also evident that with the ordinary enforcement of the sanitary code and the other municipal ordinances as they stand, a reasonable degree of sanitation and decency could be maintained.

The continuous and rigid enforcement of the law, if that were made possible by sufficient appropriations, regarding the accumulation of refuse in vacant lots, garbage collection and disposal, manure removal, etc., would very effectively eliminate fly-breeding nuisances in particular. The enforcement of these laws, together with the other anti-fly efforts in this particular section of the Bronx, most assuredly reduced the number of flies in the district. This was determined by actual comparative counts made in the two sections studied. There were many other evidences of the beneficial effect of the work upon the general sanitary tone of the community. New garbage cans with lids were to be seen in abundance, in one instance the nurses counting thirty-nine new cans in a single large tenement. This is an illustration of the general improvement which took place.

STATISTICAL RESULTS.

In studying the statistical results of the research, reference should be made frequently to the population tables presented on a previous page. We may first consider the question of mortality in the two areas studied. The numbers were few in both places, as was inevitable on account of the small number of people actually included in the experiment. Consequently, mortality figures are of less importance than those for morbidity. They are presented in Table V according to age groups.

TABLE V.

Total Comparative Mortality by Age Groups.

	<i>Protected Area.</i>	<i>Outside Families.</i>
Under 1 year.....	1	2
1 to 5.....	1	3
5 to 15.....	0	0
15 to 30.....	0	1
30 and over.....	0	0
Total.....	2	6

It is seen that the ratio which the deaths in the protected area bore to deaths in the unprotected families was 1 to 3. A similar ratio of 2 to 5 in

regard to deaths under five years would be of more significance were the figures larger.

When we come to the consideration of morbidity, we are dealing with larger figures and are given a more reliable basis for legitimate comparison. Our statistics showed that of the cases of sickness of all ages and from all causes there were 110 in the protected area and 165 outside. Before considering these cases according to age groups, percentages and special causes, it may be well first to present a summary of the total morbidity.

TABLE VI.
Summary of Comparative Morbidity.

	Protected Area.	Outside Families.
<i>Communicable:</i>		
Transmissible by flies { Diarrhoeal disease . . .	20	60
{ Tuberculosis	2	5
Cerebro-Spinal meningitis	0	1
Measles	6	9
Whooping-cough	9	20
Impetigo	20	12
Chicken-pox	0	3
Typhoid	1	0
Syphilis	4	0
Scabies	0	2
Ophthalmia neonatorum	1	0
Bronchitis	0	2
Tonsilitis	3	4
Pneumonia	2	2
Abscess	4	4
Boils	2	1
<i>Non-Communicable:</i>		
Congenital malformation	1	2
Cancer	1	0
Convulsions	0	1
Hernia	1	1
Rheumatism	2	3
Other	31	33
	—	—
Total	110	165

The statistics in this table refer to the actual number of separate, reported cases in each district. It will be noticed that non-communicable diseases are almost the same in number, the ratio being 36 to 40. This leaves the great difference in the total figures ascribable to communicable, transmissible affections, the ratio in this group being 74 to 125. Of the diseases about which, it is reasonable to suppose, the fly in this climate frequently acts as a transmitter through surface carriage, the ratio is 22 to 65.

When the figures for total morbidity were studied according to age groups, the distribution was as is indicated in Table VII.

TABLE VII.

Comparative Total Morbidity by Age Groups.

	<i>Protected Area.</i>	<i>Outside Families.</i>
Infants.	32	30
1 to 5.	50	83
5 to 15.	7	22
15 to 30.	7	9
30 to 50.	12	17
Over 50.	2	4
	—	—
Total.	110	165

It can be calculated from this table that the ratio of the total morbidity among the children under five, between the protected and unprotected areas, is 82 to 113.

As is indicated by the previous studies, the most striking difference in the two areas is found in the figures for diarrhoeal disease. We will, therefore, pay special attention to the figures for this form of morbidity. Special tabulations were made, based on these statistics and the result of this work will be presented in the following tables:

TABLE VIII.

Comparative Diarrhoeal Disease by Age Groups.

	<i>Protected Area.</i>	<i>Outside Families.</i>
Infants.	12	19
1 to 5.	8	38
5 to 15.	0	2
15 to 30.	0	1
30 to 50.	0	0
Over 50.	0	0
	—	—
Total.	20	60

As would naturally be expected, practically all the cases fall in the age groups under five years. There were twenty such cases in the protected area and fifty-seven outside. The duration of these cases was also recorded and is indicated according to time periods in Table IX.

TABLE IX.

Comparative Diarrhoeal Disease Cases by Duration.

	<i>Protected Area.</i>	<i>Outside Families.</i>
1 to 5 days.	6	0
6 to 10 days.	7	20
11 to 15 days.	1	22
16 to 20 days.	2	4
21 to 25 days.	2	6
25 to 30 days.	1	2
Over 30 days.	1	6

The striking difference in the total number of days of sickness in each area is shown in Table X.

TABLE X.

Comparative Total and Average Duration.

	<i>Protected Area.</i>	<i>Outside Families.</i>
Total days of sickness.....	273	984
Average case duration.....	13 $\frac{1}{4}$	16 $\frac{1}{2}$

This table also suggests, as do the total figures for morbidity and mortality, a greater severity and protractedness of the cases in the unsanitary section.

OTHER FACTORS.

Further than the consideration that all the reduction in diarrhoeal disease was not due to fly elimination, there are other criticisms on the findings which will be taken up immediately. Concerning the other factors possibly active in the section in reducing the infant morbidity rates, it must be remembered that in making the original selection of the district an area was taken in which practically no infant-welfare work was being done and in which the conditions were uniform throughout. The section was recommended to us for the experiment by several agencies interested in infant welfare for the reasons just stated. In order to determine, however, what were the circumstances concerning the other factors presumably of importance in infant life, a special investigation, but, as before stated, unaccompanied by educational work, was made each week into some particular problem.

The only active infant-welfare agency in the district was a diet kitchen, and the investigation supported the original supposition that the activity of this diet kitchen was quite uniformly distributed over the two districts, the percentage of families receiving milk from the diet kitchen being the same in each section.

The type of milk used was analyzed and another study was made into the type of feeding employed. The results are given below:

TABLE XI.

Comparative Feeding Methods.

<i>Type.</i>	<i>Infants in Protected Area.</i>	<i>Infants in Outside Families.</i>
Breast alone.....	88	85
Bottle alone.....	14	15
Both breast and bottle.....	23	3
Eating solids.....	1	13
	—	—
Total infants.....	126	116

The only difference in this table of any great importance is the excess in the number of infants among the outside families who were being fed other things than milk. Considering the uniformity of conditions as regards the other factors, however, the difference in this one factor of eating does not seem to be large enough to accredit great importance to feeding methods as a factor in the investigation.

CONCLUSIONS.

How much importance is to be given to the rather striking figures presented in the foregoing report bearing on diarrhoeal disease among infants? The investigation was hampered by certain unavoidable limitations. In the first place, it was impossible owing to the late date at which the bureau entered upon its activities to start the investigation at the beginning of the fly season. It is recognized by everyone that the time in which to begin an anti-fly crusade is in the early spring. Should the experiment be continued another summer, this difficulty could, of course, be removed. The time of investigation was an exceedingly short one, only eight weeks being given to actual medical inspection. This is a drawback, as is also the small number of cases included in the study. Much greater value could be given to the findings if it were possible to deal with thousands of children rather than hundreds, and hundreds of cases of sickness rather than the small numbers herein considered. It is true, also that owing to the large amount of general sanitary work which was done, it is impossible to accredit the disease reduction strictly to the house-fly elimination. There were fewer flies and there seems to have been less disease, but how much of this was due to general sanitary improvement and how much was the result of fly elimination, it is, unfortunately, impossible to say. Another criticism of importance is the fact that while the two areas were presumably approximately the same in every known particular, the balance between the two groups was not as exact as might be desired. Further than this, while it was perhaps reasonable to suppose that the amount of sickness at the very beginning of the experiment was presumably the same in the two districts, and that the smaller number of cases of diarrhoeal disease among the children in the protected area in the first week of actual inspection, compared with the sickness among the children in the other area, was the result of the strenuous educational campaign carried on for the three weeks preceding the first inspection, it is not definitely known how much disease there actually was in the two areas before any work was done. Diarrhoeal disease had been fairly uniform throughout the whole area in previous years, and it was supposed that such was the case this year. However, should the work be repeated or continued, it would be wise to obtain as nearly as possible all the facts bearing on the amount of disease in the two groups, before the anti-fly work is begun. The study is incomplete, in these and other

respects, and undoubtedly, on a basis of the present findings, we are not justified in attempting to revolutionize infant hygiene. No such attempt will be made, though the facts should be presented and given what credit they deserve until substantiated or revised by further experimentation.

It is felt that the work herein presented is of importance because of the direction it should give to further investigations along this line in northern cities. It is felt that sufficient reliance may be placed on the work, particularly the practical results in the field, to justify an insistence upon the enforcement of the sanitary code in so far as it reaches fly-breeding nuisances. The statistical results also justify the placing of a greater emphasis upon educational work among the mothers regarding the dangers of the house fly in the lives of the infants. This element should become a more important factor in infant welfare work. Finally, the bureau thoroughly recognizes the limitations of the study this summer and is convinced of the necessity of continuing this experiment on a larger, more comprehensive and complete scale through at least one other fly season, before definite positive conclusions can be reached. At the same time every effort must be made to limit the work strictly to the fly. The anti-fly efforts should be carried on in the home itself, and with the infant and his food. Complicating outside general sanitary influences should be avoided. Under whatever auspices this investigation may be continued, it is felt that on the basis of the experience so far, it would be possible with further experimentation to arrive at definite and accurate conclusions regarding the relationship of the house fly to the transmission of diarrhoeal disease. The attempt is not being made to draw conclusions from the work so far. The results are presented simply as a record of work done and progress made. In any community the most delicate social and sanitary index is the welfare of society's potential citizen, and because this is true, every effort should be made to arrive at accurate values in this and other problems of infant welfare.

MIDWIVES IN AMERICA.

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"THE SAFE DELIVERY OF WOMEN IN CHILDBIRTH IS A MATTER OF NATIONAL IMPORTANCE."—*Newsholme.*

The problem of the midwife as a factor in American life is one which is being considered with increasing seriousness by those who are interested in the prevention of blindness and in other phases of infant welfare. Although the carelessness of many physicians is equally reprehensible, it is due in great measure to the ignorance and neglect on the part of midwives that many babies become blind from what is commonly known as babies' sore eyes (ophthalmia neonatorum).

So far as it is possible to estimate from reports secured from the secretaries of state departments of health throughout the country, midwives attend about 40 per cent. of all births in America.

The extent of their practice is not definitely known and it certainly varies in different localities, but the following percentages of births, attended by midwives during 1912, as furnished by local health officers, are suggestive:

San Francisco.....	25.0 per cent.
Omaha.....	25.0 per cent.
New York.....	39.2 per cent.
Chicago.....	45.0 per cent.
Toledo.....	51.0 per cent.
New Orleans.....	70.0 per cent.
St. Louis.....	75.0 per cent.

That this is not altogether an urban problem is indicated by reports from various state departments of health, estimating that during 1912 midwives attended 60 per cent. of the births in Alabama, for example; 40 per cent. in Maryland; 80 per cent. in Mississippi; 35 per cent. in Virginia; 50 per cent. in North Carolina; and 50 per cent. in Wisconsin.

The importance of the midwife problem in this country, however, is not measured by the extent to which she practises; for in Denmark, for example, although midwives attend between 90 and 95 per cent. of all births, in that country there is neither the same high death-rate among infants, nor the relative amount of unnecessary blindness which exist in this country.

The blot on our escutcheon is the fact that we give the safekeeping of nearly one-half of our mothers and babies into the hands of women who are ignorant, careless and dirty because they are neither trained nor supervised.

Investigations of the condition of midwives made in various cities during the past few years—notably in New York, Chicago, Cleveland and Baltimore—all disclose much the same information concerning these women. Although there are in America many competent midwives who have received careful training in European schools, reports from various parts of the country indicate that the majority of those practising here are dirty, ignorant and untrained. The extreme ignorance of some of the more unfit of these women is suggested by the superstitions which they foster; one, for example, will advise the mother to wear a string of bear's teeth to make the child grow strong; another that in cases of tardy labor it is beneficial to throw hot coals on hen feathers and place them under the patient's bed; another that it is flying in the face of Providence to bathe the infant before it is two or three weeks old; while others recommend that such articles as cabbage hearts, bacon rinds, beer, etc., should be included in the baby's dietary. This type of midwife knows nothing of hygiene, asepsis or antisepsis and is often practically responsible for the death and invalidism of mothers as well as the death, blindness and mental and physical impairment of infants. Visits to the homes of these women fill one with dismay, for only too often one finds that a midwife with a large practice is herself a dirty, unkempt person living in a squalid tenement. A deplorably large group is exemplified by the old woman of 80 who declared, "I am too old to clean; too weak to wash; too blind to sew; but, thank God! I can still put my neighbors to bed."

Only too often the American midwife assures her patients that it is natural for babies to have sore eyes, and she prescribes such remedies as milk, lemon juice, lard, raw potatoes, scraped beef, saliva, etc., and when the babies go blind, she piously declares that it is the Divine Will.

However, bad as the midwife is, we are sorry to have to admit that on the whole a patient is often better off in her hands than in the care of many of the physicians who compete with her. Investigations which have been made concerning the etiology of ophthalmia neonatorum and puerperal septicæmia indicate that more of these cases are to be traced to physicians than to midwives.

I cite the results of a single such study as an example. The numbers are too small to furnish conclusive proof, but they are suggestive and quite typical.

Of 108 cases of ophthalmia neonatorum investigated by the New York Committee for the Prevention of Blindness in 1913, it was found that 62 were attended by physicians, 43 by midwives and 3 were emergency cases attended by neighbors; 48 of the 62 physicians used no prophylactic against

ophthalmia at birth, nor did 32 of the 43 midwives. In 11 cases in which injury resulted, 6 infants lost one eye, 2 eyes were scarred, while 3 infants became totally blind. The cases of total blindness all occurred in the practice of physicians, while of the remaining 8, 6 were physicians' cases and 2 were midwives'.

It was also learned that 68, or more than half of these infants were taken to eye clinics upon the advice of a lay person, while among the physicians and midwives, the latter were apt to advise hospital treatment for inflamed eyes, while the physicians gave instructions for home care, leaving the details to the mothers with the above results.

Unhappily the problem as a whole presents other aspects quite as serious and certainly more pathetic than the conditions hinted at above. The utter absence of any provision in some of our isolated rural districts for the care of mothers and babies, by either doctors or midwives, gives rise to situations which are distressing beyond words.

Competent physicians are not apt to settle themselves in such communities as are here referred to and certainly it would seem a pity if they did. Excepting in time of the occasional emergency, much of the skill and scientific training represented by such doctors would be wasted. But the mothers and infants in these places have less recourse to relief agencies than the poor in large cities and are consequently pathetically in need of the services which a trained midwife is able to give.

From one such locality one learns that when a woman goes into labor, the first passing teamster is hailed; or perhaps a member of the family hurries down the road for the nearest tanner or blacksmith, or anyone else who through total ignorance will fearlessly rush in to meet the great emergency. The results of the practice—dismembered infants lying on the floor and badly injured mothers—are too sickening to describe, but they can be imagined by those who know the value of trained work.

Contrasted with this we hear from another similar district of a nurse with obstetrical training who has volunteered her services for visiting work among the mountain poor, and who, during the past few years, has delivered about 400 infants. She has given nursing care to the mothers and babies in her charge and has taught the mothers in even the poorest huts how to take care of their own infants. In one case this nurse had to scour a skillet with ashes to provide herself with something that would serve as a basin from which to bathe both mother and infant. But in spite of this meagre outfit they were both bathed and well cared for. This nurse has even managed to have some of the mothers, whom she has delivered, taken to a nearby town and given much-needed surgical treatment.

In America we safeguard only part of the infant population by generally requiring that a physician shall be of good character, well educated at the outset, spend from two to four years in study, and pass a state board

examination before he is legally qualified to assume the responsibility of attending upon the birth of a child; while a nurse must spend two or three years in hospital training before she is considered competent simply to execute the orders of the physician, and give nursing care to mother and child during that critical period of two or three weeks immediately after birth. But excepting in a few localities, both of these functions—those of doctor and nurse—may be discharged by any untrained, ignorant woman who chooses to style herself a midwife!

So far as we are now able to learn, the United States of America is the only civilized country in the world in which the life and health and future well-being of mothers and infants are not safeguarded so far as possible by statutory requirements for at least the training and licensing of midwives. In most of the European countries the training, licensure and control of midwives are regulated by national law, while in some others—in Germany, for example—there are independent state laws regulating the work of these women. Some countries have gone so far as to provide the poor in isolated communities with the services of midwives at public expense. But apparently in no other land has the whole matter been given so little attention as in America.

In striking contrast to the provisions in other countries we find that in America midwives are allowed by law to practise unrestricted in thirteen states,* while in fourteen† there are no general laws relating in any way to their training, registration or practice.

In the remaining twenty-one states and in the District of Columbia where there are laws relating to midwives, it is required in twelve‡ and in the District of Columbia that they shall pass an examination before receiving from the State a license. In six states§ midwives are restricted to attendance upon normal cases, while in seven states|| the existing state provisions for their regulation are so inadequate as to be practically without effect. In New York and Pennsylvania the legislatures of 1913 enacted laws which will make possible the adoption of satisfactory systems of licensure, registration and control in these states.

The following extracts from some of our laws show how little thought has been given to the midwife as an influence for or against the public weal.

The Medical Practice Act of Maine says: "This Act shall not apply to midwives who lay no claim to the title of physician or doctor"; and the main provision of the law of North Carolina is: "That it shall be unlawful

*Arizona, Arkansas, Florida, Georgia, Idaho, Kentucky, Maine, Mississippi, New Mexico, South Carolina, Tennessee, Vermont, West Virginia.

†Alabama, California, Delaware, Massachusetts, Michigan, Nebraska, New Hampshire, North Dakota, Oklahoma, Oregon, Rhode Island, South Dakota, Texas, Virginia.

‡Connecticut, Illinois, Indiana, Louisiana, Maryland, Minnesota, Missouri, New Jersey, Ohio, Utah, Wisconsin, Wyoming.

§Illinois, Maryland, Missouri, New Jersey, Ohio, Wisconsin.

||Colorado, Iowa, Kansas, Montana, Nevada, North Carolina, Washington.

for any midwife or other person who habitually gets drunk, or who is addicted to the excessive use of cocaine or morphine or other opium derivative, to practise midwifery for a fee."

In no state is there state-wide provision for supervision of midwives in their practice. In some states this function is discharged by a few local boards of health, but because of inadequate appropriations for such work the results are not wholly satisfactory.

Supervision is of great importance and may accomplish a great deal if it includes a certain amount of practical instruction and explanation, but inspection which means only the perfunctory checking off of the contents of the midwife's bag is almost useless.

If we are to prevent infant mortality, blindness and other calamities which, in many instances can be prevented by careful and intelligent care, we must provide the means for the adequate training of those women who have the welfare of mothers and babies in their keeping.

Registration, supervision and control are important only as secondary measures, for the foundation upon which all of this work must inevitably rest is thorough preparatory training.

Doctor Newsholme says: "The evidence already available points to the conclusion that infant mortality can be lowered by giving adequate training and help to midwives. This especially applies to the saving of infant life at and soon after birth. It has also to be remembered that the midwife's influence with the mother, whom she has helped in her need, is very great; and it is her advice as to the management and particularly as to the feeding of the infant which is most likely to be followed." *

In only six states and in the District of Columbia is it required that midwives shall be trained. The requirements in the District of Columbia and in Maryland are met by having been in attendance at five cases of birth. In Indiana and Minnesota midwives must either have attended a recognized school or have passed an examination, before being permitted to practise. But midwives cannot secure training in either of these states, since they have no recognized schools. This is true also of the states of New Jersey, Ohio and Wisconsin—in which training in a recognized school is made obligatory, before censure.

So far as we are able to learn, the only school for midwives of undoubted high standards in this country is the Bellevue School, established in 1911 in New York City as a result of the combined efforts of the Trustees of Bellevue Hospital and the Committee for the Prevention of Blindness. The capacity of the Bellevue Training School is fifty pupils, the course at present covering a period of six months, which it is hoped will eventually be lengthened.

* "Infant and Child Mortality," by Dr. Arthur Newsholme, Chief Medical Officer of Local Government Board. Supplement to Board's Annual Report, 1909-10, presented to both Houses of Parliament.

The character of the work done by the small group of graduates from this school is extremely gratifying. Although it is acknowledged that the course given is too short, these midwives have commended themselves to both physicians and social workers because of the good care they give to their patients and because they secure adequate medical assistance for other than normal cases.

During the year of 1912 the New York City Department of Health issued licenses to 1,395 midwives. Since then the department has adopted an ordinance requiring a certificate or diploma from a training school of which it approves, before granting a permit to practise as a midwife.*

As the Bellevue Training School is the only one in New York City registered by the Department of Health as "maintaining a satisfactory standard of preparation," it is quite evident that there is need in this one city at least for more extensive provision for the training of midwives.

In those cities and states where no schools exist, there is of course a greater need of education facilities if preparatory training is to be a requirement for licensure to practise.

Unquestionably the midwife problem in America has been too long ignored. It should be faced and one of two courses followed: midwives should be eliminated or they should be trained, licensed and placed under state control.

Probably the reason why this abuse has remained so long unrecognized and uncorrected is that the employment of midwives has never been a common practice among American women, although it is a widely prevalent custom among almost all other nationalities. With the rapidly increasing stream of immigration to this country the problem of the midwife, formerly of relative insignificance, has steadily grown in importance until it has attained its present formidable dimensions. So long as we continue to have this steady stream of foreigners pouring into our country, bringing with them the customs of their fatherlands, just so long and to an increasing extent will there be women of some sort discharging the function of midwives, this practice being one of their oldest and most deeply rooted traditions.

*At a meeting of the Board of Health of the Department of Health of the city of New York held in the said city on the 14th day of October, 1913, the following resolution was adopted:

Resolved: That the rules governing the practice of midwifery in the city of New York adopted by the Board of Health November 8, 1907, be, and the same hereby are, amended so as to read as follows, the same to take effect on and after the first day of January 1914:

Rule 3. The applicant must be twenty-one years of age or upwards, of good moral character, and able to read and write. She must be clean and constantly show evidence, in general appearance, of habits of cleanliness.

The applicant must also present a diploma or certificate, showing that she is a graduate of a school for midwives registered by the Board of Health of the city of New York as maintaining a satisfactory standard of preparation, instruction and course of study, but the requirement of a diploma shall not apply to an person who is now, or heretofore has been, authorized to practise midwifery by the said board.

(Signed) EUGENE W. SCHEFFER, *Sec'y.*

The desire of foreign women to employ midwives and the determination of midwives to be employed is so strong that even were midwives legislated out of existence they would still be called in by expectant mothers who, instead of paying the fee as such, would leave the usual sum of \$5 or \$10 in some place where the midwives would be sure to see it. Or should the midwife desire to evade the law she could always find a physician who, for small consideration, would sign her birth certificates, thus leaving her free to practise without the knowledge of the authorities. The patients themselves turn instinctively to midwives in their hour of need, while among the Italians the husbands of the expectant mothers will seldom permit a physician or "man-midwife" to be employed.

Attempts are being made to eliminate midwives in some localities, and they may be crowned with success. But the figures previously given for the larger part of the country, from both cities and rural districts, show how impossible it would be to wipe out such a large and widely distributed profession from the country as a whole.

Elimination would carry with it the necessity of providing some means for the care of the large number of patients at present in the hands of midwives. The combined efforts of doctors, nurses, maternity hospitals and out-patient departments could not meet the demands made upon them by such a large number of patients over and above those they are now caring for. And more than this, if midwives were eliminated many of the patients now being attended by them would fall into the hands of that class of practising physicians which at present is doing as much or even more actual harm than the midwives themselves.

Nor can the social and economic aspects of the question be lost sight of. The midwife is almost a necessity to many of those whom she attends, offering, as she does, both medical attention and nursing care at a cost which seldom if ever exceeds the doctor's fee for medical attention alone. The midwife acts not only as a visiting nurse, but as general adviser and woman friend at a period which is fraught with much anxiety and terror. She frequently prepares the meals and gives aid in a variety of forms which an attending physician could not and would not attempt to offer.

Remembering the poverty and isolation of many of the midwife's patients and the twofold nature of the latter's offices, one can readily understand the tenacity with which her patients cling to her.

It has been advocated that the extension of maternity hospital accommodation would provide gratuitous hospital care for those patients who now turn to midwives. Assuming that the patients could be educated to this point soon enough after their arrival from foreign shores, it is in many instances inadvisable to remove the mother from her home for what must inevitably be an uncertain length of time. The mother's mere presence

in the home often exerts an influence which cannot be removed with safety to others members of the family.

It would appear that the only course for general adoption toward the solution of this problem in America would be the training, licensure and control of midwives where ever they are practising to any great extent. The number of practising midwives would inevitably decrease as the standard of the profession was raised;* those practising would do better work themselves and would call in competent physicians more frequently than they do now.

A beginning toward this end has been made in New York City by the establishment of the Bellevue School for Midwives, and by the efforts of the New York City Department of Health in controlling its midwife problem. The health department requires specified training before licensure and is exercising more and more rigid supervision of practising midwives in New York City.

For the improvement of the practice of midwives throughout the remainder of the state the Public Health Council, established by an act of the legislature of 1913, is empowered to amend the sanitary code, which code may include provisions regulating the practice of midwifery in New York State, outside of New York City. The Public Health Council already has under consideration measures for midwifery reform.

Resolutions favoring the training, licensure and control of midwives by state authority have been adopted by a number of important medical, philanthropic and nursing organizations.

During the past year several members of the nursing profession have registered as midwives with the New York City Department of Health for the purpose of exerting their influence and lending their aid toward raising the status of the profession of midwifery. Further interest in this subject was evinced by the disciples of Florence Nightingale—an earnest worker for midwifery reform—at the first annual meeting of the National Organization for Public Health Nursing, held in Atlantic City, June, 1913. At this meeting a Committee on Midwives was appointed to consider this subject, to offer suggestions and to take steps toward raising the status of the midwife profession.

In advocating that the status of the midwife profession in America be raised, one cannot but feel that both midwives and members of the lay public should be impressed with the wide difference between a midwife and an obstetrician. The midwife should not vie with the doctor, but rather should be a competent visiting nurse with midwife training, who would

*Somewhat similar measures have recently accomplished much for medicine in this country. Witness the fewer medical schools, fewer and better medical men graduated from the schools, and a general uplift along all medical lines. In the United States during 1913, as compared with 1912, the medical schools were decreased by 14, the students by 1,200, and the graduates in medicine by 500.—Report of the Federal Bureau of Education.

be permitted to conduct only normal deliveries, and be obliged to secure medical attention for her patients upon the appearance of carefully defined symptoms of abnormality or complication.

Accordingly, the greatest value of her services would lie in giving intelligent nursing care to the mother and her infant during the twelve or fourteen days following delivery; advising the mother as to her own hygiene before and after labor and arming her with that most valuable and desirable possession, knowledge as to the care of her own infant.

As for the fear that trained midwives would invade the province of the physician, the reverse of this has proved to be the result of giving better training to midwives in England. And, to the credit of American physicians, be it said that they do not, as a body, advance this objection. Physicians and laymen alike are recognizing the fact that this is not a question of providing a living for doctors. It is entirely a problem of securing better care for mothers and babies.

For the purpose of securing as broad a view as possible of this problem and suggestions for its possible solution in this country, the New York Committee for the Prevention of Blindness, in addition to collecting the laws in the United States, has made a study of the laws relating to midwifery training and control in fourteen European countries and Australia,* and of the curricula of foreign midwife training schools.

As the conditions in England, before the passage of the Midwives Act of 1902, closely paralleled those existing in America today, the secretary of the Committee for the Prevention of Blindness was commissioned to visit England for the purpose of making a detailed study of the working of the Midwives Act. This investigation included (a) a study of the early history of English midwives; (b) legislative history of the Midwives Act of 1902; (c) the organization, powers and duties of the Central Midwives Board appointed under the Act, and its methods of examination, licensure and control of practising midwives; (d) the training of midwives as carried on in hospitals and out-patient departments of hospitals and by physicians and certified midwives in their practice; (e) the administrative methods of local health officers, together with records of the work done by midwives under their supervision, and a study of the practical work done by the midwives themselves; and (f) the general effects of the workings of the Midwives Act.†

Women engaged in this profession in England are required: (1) To take a course in midwifery in a training school sanctioned by the Central Midwives Board, which was appointed by an Act of Parliament in 1902; (2)

*A digest of the foreign laws has been prepared and may be obtained upon application to the New York Committee for the Prevention of Blindness, 130 East 22d Street, New York City.

†A copy of the report upon this study of the working of the Midwives Act of 1902 may be obtained from the New York Committee for the Prevention of Blindness, 130 East 22d St., New York City.

To pass the examination given by the Central Midwives Board, and to present certificates of their good moral character; (3) To be registered and licensed by the board after examination; (4) To conform to the rules and regulations formulated by the board pertaining to the details of their work and equipment so long as they practise.

These regulations are enforced by local supervising authorities, who employ midwife inspectors who devote their entire time to the inspection of these women, their homes, work and equipment, and to enforcing the rules of the Central Midwives Board.

While it is not possible to reduce the value of trained midwifery work in England to any concrete terms, there is significance in the fact that during the nine years, following the enactment of the Midwives Act, the percentage of deaths among infants dropped from 151 per 1,000 during 1901, to 106 per 1,000 in 1910, and the deaths from puerperal sepsis and accidents at childbirth dropped from 4.65 per 1,000 in 1901 to 3.69 per 1,000 in 1909. It cannot be claimed that this decrease of deaths among mothers and infants is due solely to the workings of the Midwives Act, but it is believed by English workers that the better obstetrical work including nursing and medical assistance now being done among the poor in England must be reckoned as one factor in this decline. Midwives in England attend about 50 per cent. of all births.

A modification of this general system would be quite feasible for adoption in this country, since the problem in America today is strongly analogous to the one formerly existing in England, though ours is of greater magnitude and complexity, and it resolves itself into the need of supplying: (1) Facilities for the training of midwives; (2) examination and licensure by the state; (3) supervision and control by local authorities under state control. Complete mastery of the situation requires that all three of these provisions exist.

Concerning training, there seem to be, as previously stated, but one reliable training school for midwives in this country. There is a large number of institutions designated as midwife training schools, but these are virtually nothing more than "diploma mills." Even these are poorly attended since there is little or no incentive for a midwife to enter them in quest of knowledge or training. A training school diploma is not necessary in order to enable her to practise.

If state boards of education were empowered to establish a standard to which all schools for midwives were required to conform, the first important step would be taken toward raising the status of this profession.

The authority to examine and license midwives should be vested with the state departments of education or the state departments of health in those states where it is not possible or feasible to create departments to deal solely with the midwife question. If one of the state departments men-

tioned required a diploma from a school for midwives sanctioned by them before granting a license, those desiring to follow this profession would accordingly be obliged to fit themselves for their work.

Midwives should be required to renew their licenses annually and to take a short post-graduate course every two or three years. Anyone not properly registered and licensed should be prosecuted for performing any of the functions of a midwife habitually or for pay.

The state department should adopt rules and regulations governing the practice of midwives and should stipulate the details of a midwife's equipment.

The control of the midwives, however, and enforcement of these rules, would be most satisfactorily carried on by local health officers. These local health officers should also be vested with power and authority to supervise the midwives themselves, their work, home and equipment, and temporarily suspend them from practice for the sake of preventing the spread of infection.

Thus the three needs—education, state licensure and supervision—would be met, and in time this would inevitably spell the solution of the midwife problem.

It has been stated that at least 40 per cent. of the births in America are attended by this group of practitioners. The question before us is, therefore, not whether or not we shall have midwives in America, but rather whether or no we shall continue to pass by with averted eyes and leave such a large percentage of mothers and new-born infants in the hands of ignorant women incapable of discharging the important functions which they assume.

"It is the lame and the blind who are paying, the working woman with permanently impaired health, and the motherless children!"—*Alice Gregory*.

THE MEANING OF "FAITH CURES" AND OTHER EXTRA-PROFESSIONAL "CURES" IN THE SEARCH FOR MENTAL HEALTH.

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Medical humbugs of one sort or another have always existed, but perhaps they have never flourished to the extent which they do at the present day, in spite of the fact that we are given to flattering ourselves upon our rapid advances in the knowledge of natural phenomena, and in particular our rapid advances in the medical sciences. The phenomena of medical charlatanry, patent medicines, and faith cures are, therefore, of especial importance to us now and, I think, have a particular significance which it is worth while to inquire into. I shall, therefore, endeavor to approach the problem, not with a view to disposing of it by acrid criticism or by casting ridicule upon the theories which are set forth by the exploiters of these various cures, but I shall try to approach it with a view to understanding what the meanings of the phenomena really may be, on the principle that there is a grain of truth in everything and that it is worth while to find out wherein lies the truth in a movement which is so widespread, and which involves the health and happiness of so many people.

I am particularly anxious that we should approach this problem in a judicial and unimpassioned frame of mind, for I am convinced that the phenomena under consideration are of great importance and that they represent a source of considerable suffering and not infrequently of positive danger to a great many people who might be relieved by adequate and rational treatment. I am also convinced that a study of the conditions under which they manifest themselves offer most valuable suggestions in indicating the way we should go in dealing with certain problems of mental hygiene. It would be a pity if phenomena, which offered so much in the way of valuable material for study, had their usefulness destroyed by being approached in any other than a calm spirit of inquiry. In fact appeals to prejudice or to passion are almost sure to aggravate the very difficulty that they are brought forward to cure. The various sects of healers, of one sort or another, that have grown up around the borders of the medical profession have not failed to demonstrate this general law of mankind. They have thrived under attempts to exterminate them because they have been given an opportunity to pose as martyrs and have thus been knit together in a stronger union to oppose a common foe, and have, therefore, like all peoples, who have been able to survive persecution at all, ultimately thrived under it. Let us see if we can understand somewhat of the principles which are involved.

In the first place, we may feel sure that the growth of these various sects

of healers has taken place in response to a demand upon the part of the people. They have come into existence because of a need which a large number of people have, and they are, so to speak, the answer to that need. That need, of course, expressed simply is the need for better health, but if we will confine ourselves more particularly to the class of cases that interest us at this conference, namely the mental cases, it is a need for greater happiness, for greater peace of mind. Beyond that the need need not be more specifically expressed. In this restless civilization of ours it is pretty difficult to find a place where one may feel that he has attained the things which make life worth living and is no longer assailed by cares and worries that destroy all of the conditions upon which peace of mind may be based. The restless multitude, seeking for peace of mind—for happiness, for fulfillment, or whatever you wish to call it—express the need that I spoke of a moment ago, and so along comes a whole host of medical, religious, even political and sociological sects of various sorts which minister to this cry for help. Some people get comfort out of religion; some people get comfort out of associating themselves with various charitable or reform movements; fads of all varieties and in every sphere of life grow up, and among them come these sects of healers who point out to the dissatisfied—the unhappy—that their trouble is due to this or that, that it is dependent upon some physical disorder, perhaps of the kidneys or some other organ of the body, or that it is mental in origin, and, therefore, needs some kind of psychotherapeutic treatment. A certain portion of these unhappy people flock to the standards that are raised by these individuals who claim to know what the matter is with them and how they may be cured. This attitude is perfectly understandable. It is not only not strange that it is so, but it would, indeed, be strange if it were not so. The chronic invalid will almost surely and quite naturally take the advice of a man who says confidently "I can cure you." Who would not? Wouldn't you and I if we had been pronounced hopelessly ill, if we had spent years in fruitlessly seeking health only to see it gradually failing us? Why not at least try?—it can do no harm, and then this same man cured Smith and Jones, and perhaps he may cure me. It surely is worth the trial. This argument is controlling if we have no standards of comparison that we have made our own by which we may judge of the real value of the claims set forth. It must be remembered, too, that many of these practitioners are sincere in their beliefs and really think that they can do what they claim, and we must also not forget that they do succeed in doing what they claim, at least apparently, in a sufficient number of cases to give some warrant for their faith in themselves and for other's faith in them.

If we will look over the history of these cures we will find that almost everything which the imagination may conjure up has been used to cure the ills of human kind and that almost every ill that can be imagined has

been reported cured by such means. People have been cured of most everything under the sun, by little pieces of metal, by bottles of medicine, by salves, by electricity, by holding on to iron rods that led into a tub of bottles and water, by hypnotism, suggestion, and finally by religion, and all these various means of cure have cured ills equally various and have all cured the same sort of ills. Now the first principle that I may lay down from this statement is that whenever we find a certain kind of illness cured by various and divers means, under all sorts of conditions and circumstances, we may feel reasonably certain that nothing in the agent applied has really had anything to do with the recovery of the patient; that the patient not only carried within himself the conditions which made him sick, but he also possessed within himself the powers which rightly used could make him well, and that the most which the remedies offered could possibly have done was to awaken within him these powers and cause him to put them to use. A paralysis which may be cured indifferently, either by a bottle of medicine, the application of a magnet, or a prayer, is certainly not the sort of paralysis which is dependent upon any material disorder of the body that we know of; certainly not the kind of paralysis which requires for its amelioration the bringing into contact with the disordered tissues a remedial agent of some sort; certainly it is quite different from this, and you may easily understand from this example why it is that I say that the patient contains not only the conditions which make his disease possible, but also the power to make himself well, for it is hardly conceivable that such different remedies as liquid medicine, the application to the surface of a magnet, and prayer could have some common quality which was responsible for the result.

It is this class of cases, which I have illustrated by the patient with paralysis, who are appealed to primarily by all sorts of alleged cures, and it is this class of cases that frequently make an apparently good recovery from their symptoms under the treatment that is given; it matters very little what that treatment is, and, therefore, these various cures derive a very great support from producing such results, a support which I think you will see from my presentation thus far is entirely an ill-deserved one, for it makes the claim of having produced a result which is not altogether a just claim, although there is a certain justice in it. Without attempting to explain just exactly how these cures are effected I may say that in such a case of paralysis as I have cited the trouble with the patient is that he thinks he is paralyzed, and when he can be made to think that he is not paralyzed then the paralysis disappears. This disappearance of the paralysis, as a matter of fact, did follow the treatment and was in some way dependent upon that treatment and, therefore, there is a certain justice in saying that the practitioner, whatever his method, really did cure the patient. Herein lies the abiding fallacy of the whole situation and the one particularly to which I desire to direct your attention.

Truth is evasive; perhaps we never can attain to absolute truth with regard to any special problem. Perhaps the best that we can do is to keep striving, and by striving to come always nearer and nearer, though we never quite attain. And so we have to measure the claims of the class of people of whom I am talking against the claims of others with a view to seeing which of the several claimants most nearly approximates the truth. Now it is true that a certain patient with a certain type of paralysis goes to one of these healers, submits to his treatment, and following the treatment the paralysis disappears. That happens over and over again, and the healer says, with some considerable reason, that he is cured of paralysis. Now let us examine this situation and see if we cannot understand it a little better than by resting at such an assertion. Perhaps I can approach what I wish to say best by an illustration. Let us take a walk through a picture gallery and let us pause here in front of a picture—a picture by an old Italian artist. There are a series of them all dealing with the same subject, the subject of St. George and the Dragon—and let us look at this one in particular and see what we shall see. The first things that strike our eye are: a picture of a certain size made up of figures, rather highly colored, upon a background relatively neutral; to the left there is a dragon; to the right a man upon horseback approaches the dragon with a lowered lance, and nearby a blonde-haired, blue-eyed maid sits passively upon a rock; in the background there is the sea with two ships riding on its surface. Now these things are all visible at a glance and all of the things that I have said to you are true. I might go even further; I might tell you, for example, that the color of the horse was brown, and that would be a truth. But what do all these truths mean to you? What do they mean to any one who sees only these truths? They are all extremely superficial. They, none of them, help us in hardly any way to understand the picture at which we are looking. We recognize that there are certain pigments spread on canvas and that they form these several outlines that I have described to you, and that they are formed in certain colors and in certain relations one to another, but these truths, truths though they be, are superficial and have little meaning and certainly practically no helpfulness, for what we are after is some understanding of the picture. Then let us look in the catalogue and we will find that this is one of a series of pictures illustrating the conflict between St. George and the Dragon. Here comes a distinct illumination. Now we really know something about the picture; we feel that we have come to some understanding of the canvas before us. But I wonder how much we really have found out after all. We all know that there is a legend of a fight between a dragon and St. George, but in most of our minds the legend is pretty hazy, and although we know it exists we do not know what it means. So let us turn to our libraries and see if we can find out something about this legend. We very soon discover that the

legend is a widespread one; that it has many variants in different parts of the world; that it undoubtedly has its roots in simpler and earlier legends of more primitive peoples, connected probably with harvest times, and thus we may correlate the story of the picture with the most widespread beliefs over the face of the earth and trace its roots down almost to the very beginnings of things in the mind of primitive man. Now surely we are beginning to understand something of what the picture really means. But even with this added light, why is the horse brown; why not some other color? Why is the hair on the man's head wavy and fine? Why are there all about the dragon skeletons and mangled bodies, and why does the hair upon these heads grow downward in great heavy masses that seem to sink into the ground like the limbs of a tree? Why is one of the ships in the background being wrecked on the mainland and the other sailing out clearly on the surface of the ocean? And so on we might ask many, many questions, and we see that still we are far from an understanding of the picture. If, however, not resting with having associated this legend with many other similar legends throughout the world, if not resting with having shown its roots among primitive peoples, we seek still further, we would find that the conflict between St. George and the Dragon, in its fundamentals, is only one of the innumerable variants of the old, old conflict, as old as mankind, the conflict between good and evil. When we have found its fundamental fact then some of these things in the picture become understandable. St. George represents the spiritual power making for good; the hair upon his head, which is fine and silk like, rises up as if it would have its roots in Heaven. The Dragon represents the power of evil, and the heads of the people who have perished in their conflict with evil have hair which grows downward into the very earth and roots them to the earth earthy. And so forth and so on the whole intricate symbolism of this complex picture leaps into our understanding, because we have finally gone deep enough in our search for truth so that we have gotten at the principles underlying it all.

Now to come back to our problem from this illustration. It is true that certain paralyses disappear after certain kinds of treatment, but if we stop there we are in no better position for understanding the phenomena presented to us than we were when we stood in front of the picture and noted simply the forms and the colors of the figures upon the canvas. We must have a more profound knowledge of human beings before such sequences of events can mean anything. If you will look in one of the rooms of this exhibit you will find a diagram, representing in a simple way the makeup of the human individual. That diagram is in the form of a triangle and the triangle is divided into sections by transverse lines. In the lowest level of this triangle is written the word Physical; above this are other levels which are designated as Chemical or Bio-chemical and Physiological,

and still at the highest part of the triangle and occupying its apex is a level designated as Mental or Psychic. The phenomena of the paralysis which I have been telling you about are phenomena at the psychic level. Without attempting to explain it any further than I have, let me show you how any one who confines himself solely to this level may fall into serious error. Suppose a patient consults an individual because of a certain type of harassing idea. Now it may well be that that harassing idea has its whole origin within this psychic level and that the treatment of one of these healers may result in the disappearance of the idea and the getting well of the individual, that is apparently. Suppose, on the other hand, that another individual with the same kind of an idea seeks one of these healers and the healer applies the same kind of treatment, but the patient does not get well. What may be the trouble? One of the troubles which may exist, and which does exist in a large number of cases, is a disorder at a lower level. This man may have Bright's disease. There may be the poison of a chronic disease of the kidneys circulating in his blood and his mental condition may only be the expression at the mental level of the real disease which lies beneath. How is the man who deals only on the psychological level going to know the possibility of such a thing. He can't, and therein lies the positive danger of these faith cures. While temporizing and trying to cure a person on the psychological level, conditions which are more fundamental are going wrong and perhaps leading the patient towards his grave. You will see here again an illustration of what I mean by the relativity of truth, that while we may only approximate truth we must at least search for it as deeply as we can, and it is only when we are stopped by being able to go no further that we have a right to say that we are at the end of our journey.

Very few of these healers would endeavor to cure any disorder at the physical level by appealing to the mind, because this is too potently ridiculous. A broken bone they would hardly endeavor to heal by suggestion. However, and only recently, I have been reading the claims of a certain school of faith curers who endeavor to do something quite as ridiculous. They suggest how, by certain mental influences, they may stop bleeding. Here is a disorder at the physical level. Suppose a vessel is bleeding; the disorder is not mental; it is not even at the bio-chemical level; it is still lower at the physical level, and the only way to stop the bleeding is by some physical method. It has to be met on its own level and no appeal to the mind will do it, and, whereas, in many instances claims of this sort may do no harm, in a case of this sort it can be readily seen how a patient might suffer serious and permanent damage while somebody was fooling with a means of cure, the application of which was absolutely illogical and absurd. Many other such instances might be cited. For example it might be subjecting the patient to the gravest danger of middle-ear sup-

puration, with possible meningitis and death as a consequence, to temporize by trying to cure an earache by mental means.

It becomes evident, then, from these considerations that the only person who is properly qualified to treat a sick individual is one who knows the problem of disease, not only at one level, but at all levels; who knows not only the length and the breadth, but also the depth of the problem; and who, therefore, has the greatest relative ability to follow truth the furthest. To confide one's health to the keeping of an individual whose whole education has been confined to one level, or whose whole education has been taken up with the exploitation of a single portion of the body or a particular theory of healing, is to court disaster, and, although it may work fairly well sometimes, on the whole it is an extravagant and wasteful business, for, although I have not yet said it, and although time does not permit going into a detailed account of the reasons for it, even the people who get well, as I have suggested, always qualifying the term well by apparently—even the people who get apparently well from the treatment which is given them are really and truly in most instances no better off than they were before. The real disease focus is never reached by these methods and only a superficial change has taken place, which is of but temporary duration; and so these people, exalted to the highest hopes by apparent recovery, are apt shortly afterward to be plunged into a greater despair than ever before by a return of their ailment. This is, of course, due to the fact that these healers not only do not understand the phenomena of the level at which they are working and with which they deal nor the phenomena of other levels. Their failures, which are never recorded, only the so-called "cures" being exploited, would show their serious shortcomings.

Further than this, purely psychological problems may be dealt with superficially or with profound psychological insight. We often hear it said that such patients, as the one with paralysis I have mentioned, are cured by suggestion or by faith. That is true, but again misleading because a superficial truth. It is true that the color of the horse in the picture before referred to is brown, but that does not mean anything until we have found that it is symbolic of the earth and stands for strength and endurance. "Now faith is the substance of things hoped for, the evidence of things not seen," but the faith that is awakened in the patient is not, as generally supposed, faith in the practitioner, but faith in themselves, and while such faith may go a long way it only too often falls short. To utilize such faith to its full, profound psychological knowledge is required, and not such superficial and dangerous empiricisms as confuse sequence with effect. You can see how vastly better qualified is the physician who has such knowledge, and very much more besides, than is the empiricist, no matter how sincere, to undertake therapeutic applications.

The type of reasoning which concludes that, because in a certain person the symptoms of his illness disappeared after the application of a certain remedy; that, therefore, that particular remedy was the cause of their disappearance, is most dangerous, because most logical. The conclusion is one of those pitfalls of the obvious to which we are all liable in proportion to the superficiality of our knowledge. It is the same kind of reasoning that led primitive man to believe that he could make rain by going through certain ceremonies. These ceremonies vary greatly, but for the most part consist of imitating a storm and sprinkling water on the ground. After they have been carefully performed in all details then it rains—sooner or later—and the rain is assumed to be the result of the ceremonial. It is the confusing of sequence with effect and is one of the most prolific sources of error and of groundless superstitions and theories. The rain comes following the ceremonial of the rainmaker, but is the result of natural causes over which he has no control whatever. Many of the reputed "cures" also come about following certain forms of treatment—also as a result of natural causes, over which the individual applying the remedy has no more control than the rainmaker.

It, therefore, follows that no one should be permitted to practise the art of healing except he be grounded in the structure and functions of the human body and the application of all varieties of remedial agents at all levels, and it is the function of the state to see that the people who are accredited by it to practise the art be so equipped.

The whole subject of medical education, the equipment of the individual to practice medicine, is a complex one, and very naturally the claims of medicine as applied to the lower levels—to the physical and the physiological—have received attention long before the claim of medicine to be applied at the psychological level. The psychological level is the last level to come within the ken of the physician because it is the most complex and the most difficult to confront and requires a great deal of knowledge about the lower levels before it can be approached at all. Therefore, it has remained the stronghold of the charlatans and the faith curists. Even the most elementary instruction is not given today in many of our medical colleges regarding the disorders at the psychological level, and the general result is that these different faith curists prosper, and the physician, knowing deep down within himself that the whole business is nonsense but having no adequate education in such matters so that he can define wherein the nonsense exists, is compelled to defend himself against them by attempting to cast ridicule upon their methods, and if approached for an explanation of what the trouble is he is pretty apt to be so weak in his replies as to help the cause of the opposition more than to hurt it. The cry of the mentally afflicted has brought the inadequate response of the charlatan, and it is because the cry is unintelligent that the answer is inadequate.

In the last few years, however, there has been a noticeable change in the whole matter of medical education. The Carnegie Foundation and the American Medical Association have been making such surveys of the medical colleges as have resulted in their being grouped into various classes according to the excellence of the instruction given. Such a public pointing out of the class to which a medical college belongs has deflected many students from the cheaper colleges, where medical education was at its lowest ebb, and resulted in the closing of these colleges because of lack of income and a resulting lessening in the number of medical students throughout the United States. The situation now is that no person can blindly go to a medical school without knowing just where that medical school stands in degree of the excellence of its educational facilities, and no individual who employs a physician need lack that knowledge. Therefore, from our side, a great step has already been taken in advance in the better equipping of the man who is to practise medicine in the community. Now, on the other hand, it remains for the public themselves to make greater demands upon the physician, and not only maintain the standard which we have reached thus far, but create a still higher one. In the matter of the ills of the mind, physicians today are, on the whole, quite unable to cope with the problems involved. Practically none of the older physicians have ever had courses in their medical training that dealt with mental disorders, and very few of the younger practitioners have ever had anything that remotely resembles anything like an adequate course of instruction. Therefore, the physicians, themselves unable to meet these conditions, are indirectly one of the greatest sources of revenue of the charlatan. The charlatan gets what the physician cannot deal with. It becomes, therefore, the duty of the physician to equip himself to handle these conditions rather than to bewail the fact that his patients go elsewhere, and he will equip himself and he will be able to handle them when the public make an intelligent demand upon him for that class of service.

You will perhaps have noted that I have not undertaken to deal in this paper with distinct frauds. There are many claims by all sorts of persons to cure disease that are plainly and simply fraudulent and require treatment from that standpoint by the machinery of the criminal law. It makes little difference to the patient, however, whether the claims are fraudulent or sincere so long as the result is the same in either case. I have merely tried to point out some of the fallacious methods of reasoning that make it possible for either or both to make a successful appeal. Ignorance is the soil in which all such claims prosper. To spread a greater enlightenment about matters mental is the object of this conference to the end that the needs of the mentally ill may be met by a more intelligent and, therefore, more helpful response than by the methods of the charlatan, the quack, or the enthusiastic and sincere faddist.

THE PREVENTION OF CARRIERS.

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The human carrier has been charged with being the principal storehouse and distributing agent of many of our infectious diseases. Chapin* has shown that the enforced isolation of acute cases of contagious diseases, although often effective in small towns and newly invaded communities, is nevertheless of little avail in improving the morbidity statistics of our principal cities. He holds that the inadequacy of isolation is due to the existence of a large number of unrecognized carriers and missed cases.

The beginning of a realization of the importance of human carriers is shown by the efforts we make to detect and control them. These measures, like the present methods of isolation, are producing a minimum of result except under the most favorable circumstances. The responsibility for the disappointing lack of results lies largely in the limitations of those methods of laboratory diagnosis by which carriers are detected, in the lack of sufficient epidemiological investigation of carriers in the field, and in the utter impracticability of effective control of most of the carriers discovered.

In laboratory examinations, one of the principal difficulties in the detection of carriers is the frequency of misleading negative results. It is a well-recognized fact that long-standing chronic carriers are often intermittent in the discharge of the infectious agent. This is well illustrated by the way in which successive cultures from diphtheria carriers give negative results between positive results. Sixty-five out of 364 carriers, discovered during an investigation by the State Hygienic Laboratory at the Southern California State Hospital,† gave positive cultures after they had given from three to eleven successive negative cultures from nose and throat. Although in some instances the reappearance may have been due to reinfection from other carriers, the conditions during the investigation were such that this was probably only exceptionally the case.

The intermissions in the discharge of typhoid bacilli by carriers is well known. A typhoid carrier who came under investigation by the California State Board of Health‡ well illustrates how adequate field investi-

*Chapin, Charles V. *The Sources and Modes of Infection*, Second Edition, 1912, pp. 136-147, 155-159.

†Henderson, Margaret. *Twentieth Biennial Report of the California State Board of Health, 1906-1908*, pp. 200-203, and an unpublished fuller report of the investigation.

‡Sawyer, W. A. *A Typhoid Carrier on Shipboard*, *Journal of the American Medical Association*, May 4, 1912, Vol. LVIII, pp. 1336-1339.

gation might help in the detection of carriers. This man had been previously suspected, but, as examinations at a city laboratory happened to be made during an intermission, the suspicion was held to be unfounded and the carrier continued to infect his comrades. An epidemiological field investigation made for the state board of health yielded a mass of information indicating indisputably that the man was a carrier, and this evidence was confirmed later by examinations at the State Hygienic Laboratory.

The example just cited illustrates how the effectiveness of our control of carriers is diminished by the common undervaluation of epidemiological field investigations when contrasted with laboratory work. The field workers should be fully as efficient and well trained as those who make the laboratory investigations. The worker in the field can produce evidence with regard to the relative importance of individual carriers by finding out what actual harm they have done, while laboratory tests classify the carriers in large groups according to the nature of the organisms isolated from them. Too often the health official puts great weight on the test of a culture of the diphtheria bacillus for its virulence for guinea-pigs while much more instructive accidental tests of the same organism on human beings remain undiscovered because unlooked for. The study of the typhoid carrier already mentioned presents an example of the value of the facts unearthed by careful investigation in the field. In this case the laboratory proved only that he was intermittently excreting typhoid bacilli which were definitely identified by cultural and serological tests. The field investigation, on the other hand, was able to show that he was an exceedingly dangerous carrier who had already infected twenty-seven men, four of whom had died. The searching of hospital records showed that the cases infected by this carrier had spent in hospitals, in the aggregate, 1,153 days, or approximately three years and two months. The field work went beyond any possible laboratory tests in showing that this carrier was much more dangerous than the average carrier, and, therefore, in need of special administrative attention.

Whatever difficulties arise in the detection of carriers, owing to the limitations of laboratory diagnosis and the lack of adequate field investigation, dwindle into insignificance beside the troubles of health officials who try conscientiously to isolate, or otherwise efficiently to control, all the carriers of serious contagious diseases who can be discovered. It is true that many carriers spontaneously cease to be such and some chronic carriers can be cured, but many of the reports of cures have undoubtedly been based on intermissions and the carriers have been released from restraint unchanged. Other apparent cures may be due to the interference of the method of treatment with the laboratory tests. For instance, there is a

greater chance of getting negative diphtheria cultures within twenty-four hours after treatment with staphylococcus spray than later.*

The most determined attempts to clear up chronic carriers sometimes meet with complete failure. For example, typhoid carriers sometimes continue to discharge typhoid bacilli after the surgical removal of the gall bladder.† Probably the best that health officials can now do is to release persistent chronic carriers with instructions regarding their occupations and habits, excepting the few specially dangerous carriers like the typhoid carrier already alluded to. Such carriers present almost insurmountable difficulties which must be faced.

Inasmuch as the detection and control of carriers has so far been filled with difficulties and productive of only slight results on the total amount of contagious disease, we should make a special effort to prevent the formation of carriers. After due discussion, we should modify our public health procedure with this in view.

A consideration of the sources from which carriers are infected is an important preliminary to the formation of plans for their prevention. Carriers of contagious diseases are infected by other carriers and by acute cases. In diphtheria we are apt to put great emphasis on the acute cases because so many carriers are detected among those who have been near them. We usually do not stop to consider that in some of these the carrier state may have antedated the acute cases and may have been responsible for them. We are apt also to regard the infection as traveling from the acute case direct to each of the other carriers. It seems more probable that, in a crowded household under the usual official quarantine, there is a repeated exchange of infection within a group of persons including carriers and acute cases. As an example of the prevalence of carriers in households containing acute cases, recent experiences of two of our California local health officers may be mentioned. In taking cultures from the contacts with diphtheria cases before raising quarantine, they found a large percentage of carriers. Examination of cultures at the State Hygienic Laboratory‡ showed that there were, in three of the households, a total of four acute or convalescent cases, sixteen carriers, and four persons whose cultures were negative.

Observations similar to the above are not infrequent and lead me to believe that the common procedure of officially enforced quarantine with optional isolation of the acute case from the remainder of the household must, in many instances, increase our carrier population enough to offset the advantage to the community from the quarantine. That the number

*Fay, Jewel. Staphylococcus Spray for Diphtheria Carriers, California State Journal of Medicine, May 1913, Vol. XI, pp. 197-199.

†Ledingham, J. C. G., and Arkwright, J. A. The Carrier Problem in Infectious Diseases, 1912, pp. 85-91

‡Monthly Bulletin of the California State Board of Health, February, 1913, Vol. 8, p. 197.

of carriers in a community is large in the presence of acute cases who have been quarantined, as far as the local health officers can enforce the law, is a well-known fact. In the absence of diphtheria cases about 3 per cent. of 350 students, coming to the University of California from all parts of the state, showed granular types of diphtheria bacilli, while, in the presence of an epidemic, 18 per cent. of 690 grammar school children at Hayward, California, showed diphtheria bacilli.* In order to diminish the production of carriers, health regulations should require the isolation of the acute case from the other members of the household, who should have only such additional restraint as may be indicated by the probability of their being in the stage of incubation or in the carrier state. Every attempt should be made to diminish the contact of known carriers with acute cases or with each other, as repeated infection may prevent or postpone the spontaneous recovery of the temporary carriers.

Carriers frequently receive their infection from other carriers. This was well illustrated during the investigation, already mentioned, of diphtheria at the Southern California State Hospital. In the first round of cultures 11.6 per cent. of the 1,115 inmates and employees gave positive cultures for diphtheria, and were put in the isolation cottage. There were no acute cases during the time of the investigation, as all the people in the hospital had been protected with diphtheria antitoxin. As the taking of cultures and isolation of carriers progressed the number of persons outside of isolation giving positive cultures dropped to 1.8 per cent. Then persons were gradually returned from isolation after they had given two or more negative cultures. The percentage of positive cultures steadily rose until it reached 11 per cent. and many of the released patients were found to give positive cultures. After the more permanent isolation of these intermittent carriers the percentage again fell rapidly.

Inasmuch as carriers may be infected by carriers, we should work to remove the conditions which favor the exchange of infection. The campaign against the public drinking cup is a step in the right direction. We must at present place our chief hope of greatly diminishing such diseases as epidemic cerebrospinal meningitis and epidemic poliomyelitis in the diminution of opportunity for exchange of infection, if we accept the growing opinion that epidemics of these diseases are essentially great increases in the number of carriers with here and there an acute case appearing as a comparatively rare accident.

In the experience at the Southern California State Hospital persons immunized with antitoxin were made carriers when exposed to other carriers. Many carriers date their condition from an acute attack which gave them a lasting immunity. Meningitis and poliomyelitis are supposed by many to be carried by persons who are unable to contract those diseases owing

*Monthly Bulletin of the California State Board of Health, February, 1913, Vol. 8, p. 197.

to the relative insusceptibility of the adult. Inasmuch as immunes may become carriers, they should be barred, like susceptible persons, from unnecessary contact with the sick. When immunes nurse the sick they should not be excused from adequate precautions against becoming infected.

A factor which would help health officials in handling the whole problem of contagious disease would be the keeping of records of known contacts with acute cases and the official exchange of information when these persons move from one jurisdiction to another. If contacts become temporary or chronic carriers or acute cases, the local health officer will be helped to discover them if he has a record of their opportunities for becoming infected. Recently the state board of health sent me to investigate the appearance of a severe disease which was causing great apprehension in a small town. A family consisting of a father, mother, and three sons had recently arrived from the middle west. Within a few days of their arrival one of the boys became seriously ill, and recovered slowly. Another son soon afterward became sick and died. At the time of my visit the third son was moribund from diphtheria which had not been recognized by the attending physicians. The parents stated that the boys had played with some sick children while coming to California in the train, and that a physician, who boarded the train, examined the children and had them removed. If those sick children were known or suspected of having diphtheria, the names and destination of the contacts should have been ascertained and reported to the local health officer, who should in turn have notified the health officer at the destination either directly or through the state board of health. I hope to see regulations made which will compel the keeping of records of contacts, which will help health officers to know what troubles to expect and to discover their source if they occur. Such measures, although not aimed chiefly at the prevention of carriers, will advance the time at which proper precautions against the spread of infection can be instituted and will prevent the forming of carriers in the interval.

The suggestions which have been presented are intended to stimulate discussion and investigation of the carrier problem with a view to devising more effective methods for reducing the amount of contagious disease. We require especially more local and state health officials who are trained to make scientific epidemiological field examinations so that our knowledge will be less strictly limited to the valuable, but restricted, information from the laboratory.

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INDUSTRIAL HYGIENE AND SANITATION.

Every forward movement in society, however productive of good, goes through a transitional period in its development marked by unsettled conditions. This has been true of industrial changes wherein unsettled conditions meant loss of human energy, and particularly true of the economic changes in the industrial world in Europe during the middle of the nineteenth century.

This movement was the transition from the guild system to the present factory system, a process whereby all the necessary elements of manufacture were concentrated: machinery, brains, brawn and capital. In the factory, one man with the aid of machinery began to do the work of several and thus increase product enormously. With increased product and highly developed machines and factories came increased danger to life. Never-

theless, increased efficiency and increased product for a long time remained the watch cry.

The pendulum always swings from one extreme to the other and in the straining effort for maximum results little corrective consideration was given to the safeguarding of life and limb. In this number of the JOURNAL an article by John B. Andrews of the American Association for Labor Legislation clearly states the problem of occupational diseases and legislative remedies. It has been estimated by experts that the United States, as well as certain other countries, loses millions annually from the sickness of laborers, not including the loss resulting from the effects of the laborer's sickness on the members of his family. The effects of the latter are many and productive of several long trains of economic disturbances, too numerous to go into at this time.

The pendulum has long since started on its swing in the other direction and although slow, it is moving. It could have been only a matter of time when the man at the machine would have to be regarded, not as a part of the machine, but as a human being and not only as a human being, but as one in need of protection from his environment, even from his own carelessness. It was soon noted that loss of efficiency in an employee entered greatly into the cost of production, and it behooved the employer to conserve the working man's power of production for financial reasons if not on the ground of humanity and decency.

Much has been done by many corporations and organizations for the safety, health and comfort of their working men and much more is planned and is being done. For these reasons, the JOURNAL is introducing a new department this month, "Industrial Hygiene and Sanitation," to assist in spreading methods, plans, innovations, and news of good already accomplished in this new and rapidly advancing field.

If you are wont to discount the efforts of some organizations along these lines because of underlying commercialism, you may remember that even if the employer does derive good interest on his investment in health preservation, also that society receives benefit from it irrespective of underlying motive.

We invite our readers' attention to this new department and ask for suggestions, articles and general information on this subject. If you are doing anything that would benefit any or all industrial workers, we shall be glad to pass the word along. The JOURNAL can be of great service through coöperation of both JOURNAL and its readers.

A STUDY OF THE GERMICIDAL ACTION OF THE ULTRAVIOLET RAYS.

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Read before the Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

I. INTRODUCTION.

The possibility of employing ultraviolet light as a sterilizing agent has received much attention within the past few years, particularly in respect to drinking water. It has been found that quantities of water as large as 600 litres an hour have been rendered bacteria free without difficulty, by exposure to the rays in one of the forms of apparatus now on the market for this purpose (8) (Westinghouse-Cooper-Hewitt). The cost and maintenance of the apparatus are, as yet, above the point where the process can enter into active competition with other forms of large scale water purification, but for small installations it has proved successful.

With liquids other than water, such as milk, beer, vinegar, etc., it has thus far been possible to obtain only a partial germicidal action. The applicability of the ultraviolet rays in sterilizing such substances as bacterial vaccines, bouillon, alkaloids, etc., has been studied but little. This investigation was, therefore, undertaken with the view of ascertaining the action of ultraviolet light particularly on these substances.

A résumé of the more important work in this field of sterilization shows that physical considerations, especially the distance of the liquids to be treated from the source of light, also the thickness of the liquid layers, maintain considerable influence. Cernovodeanu and Henri (1), who were among the earliest workers in this line, found that with bacterial emulsions the germicidal action of the ultraviolet rays decreases more quickly than the reciprocal value of the square of the distance of the liquids from the source of light. They also found the bactericidal action to be much stronger in a layer of liquid 25 cm. in thickness than in one of 2 cm. It did not change with a rise in temperature between 0° and 55°. In general, with water, no chemical or physical changes were observed, except, at most, a small rise of temperature on extended action. Essentially the same conclusions were arrived at in experiments conducted by the Royal German Experiment Station (15) and Courmont, Nogier, and Rochaix (10) in their investigation as to the presence of peroxide in water sterilized by ultraviolet light. Henri, Helbornner and de Recklinghausen (8), in a study of the sterilization of large quantities of water by the rays, point out the need of allowing sufficient time for the sterilizing action to take place. They suggest for the purpose the use of more than one lamp, and specify that the distance from the lamps to the treated water be as small as possible. Vallet (9), in a similar study, calls attention to the necessity of clarifying the water before

exposure, and recommends a sterilizing space sufficiently large to permit each particle of water to be exposed to the rays for at least one minute.

The problem of sterilizing milk by ultraviolet rays has been investigated to some extent, particularly by Romer and Sames (5), who used a Heraeus mercury-quartz lamp of six ampères strength. The milk to be sterilized was contained in a quartz vessel 15 cm. from the source of light, and the rays were allowed to act on a layer of the milk $1\frac{1}{2}$ cm. in thickness. The number of bacteria was reduced from 98,900 to 2,050 per cc. after two and one-half hours of action; a second time, they were reduced from 111,800 to 65,000 in twenty minutes' action. With the longer time of action, the taste of the milk, even with incomplete sterilization, became irritating, while, after about an hour's illumination, the experimenters found a distinct destructive action on the oxidases. Butter fat, illuminated for one and three-fourths hours, showed a decrease of 7 per cent. in the iodine number.

An investigation of the action of ultraviolet light on *Bact. tuberculosis* and tuberculin has been made by Cernovodeanu working with Henri and Baroni (11). They placed an equally opalescent emulsion of the bacteria in a quartz tube rotating about the lamp. It was found that the organisms were strongly attacked, even after a short time, being entirely killed after ten minutes of continuous exposure. Tuberculin, exposed to the rays for five minutes or over, gave no reaction when applied to tuberculous guinea pigs.

Stassano and Lematte (13) in a series of experiments have found that emulsions of various bacteria, after illumination with ultraviolet light, showed the same index to the corresponding agglutinating sera as the living bacilli did. They observed that bacterial life was very quickly destroyed by the rays, but that the substances contained in them, as agglutinins, toxins, enzymes, etc., were not destroyed thereby. They conclude that compared with other methods of sterilization this process has the advantage of not affecting the agglutinins in any manner, and should, therefore, be especially suitable for the preparation of emulsions for sero-diagnostic purposes.

The action of ultraviolet rays on solutions used in pharmacy has been studied to some extent by Lesure (6). He found that almost all were as easily penetrable as water, but that the sterilizing action was not the same, using *B. coli communis* as a test organism. Also using the colon bacillus, Vallet (4) found that dextrose and lactose solutions, glycerine, ethyl alcohol until the appearance of its own bactericidal action, acetic and tartaric acids, were made germ free when illuminated for one minute in a layer 1.5 mm. in thickness. A 30 per cent. salt solution, 22 per cent. soda solution, and 19 per cent. calcium nitrate solution were sterilized under the same conditions. However, the ultraviolet rays were held back and sterilization did not take place when the light had to penetrate a few drops of oil, or when the solution contained 3 per cent. peptone or 1 per cent. albumin.

II. LABORATORY DATA.

A. *Apparatus and Technique Employed.*

In our work with the ultraviolet rays, we used as a source of light a Cooper-Hewitt Standard "Type Y" Quartz Lamp, arranged as shown in Fig. 1 (A). The material to be illuminated was contained in a glass flask (B), connected by a sterile, glass syphon and rubber tubing with screw clamps

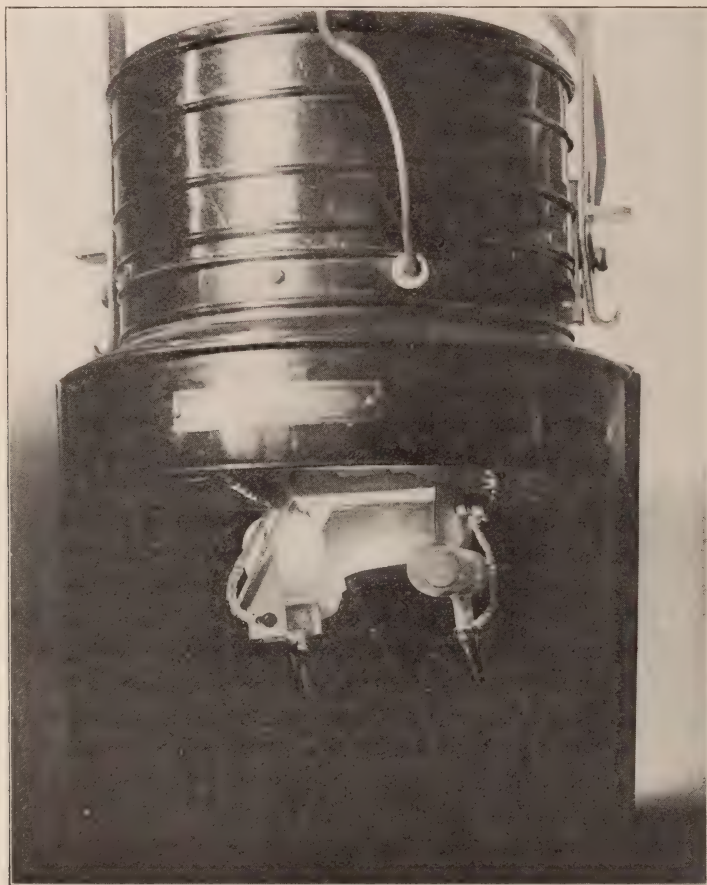


Fig. 1 (A).—Cooper-Hewitt Quartz Lamp as used for Sterilizing.

to the trough (C) placed directly beneath the arc. After exposure in the trough, the liquid passed through the delivery tube (D) into a previously sterilized container (E). The arrangement, as used for sterilizing bacterial vaccines, is shown in Fig. 2 with the protective cover in place.

In use, the lamp first caused a heavy drop in voltage with consequent high current which steadily diminished, becoming constant after about six minutes. This is seen from the following electrical data:

Initial voltage (line).....	120 volts
Initial voltage with lamp.....	34 volts
Voltage with lamp (after 6 minutes).....	85 volts
Voltage with lamp (after 15 minutes).....	85 volts
Initial current.....	8 ampères
Current (after 6 minutes).....	3.5 ampères
Current (after 15 minutes).....	3.5 ampères

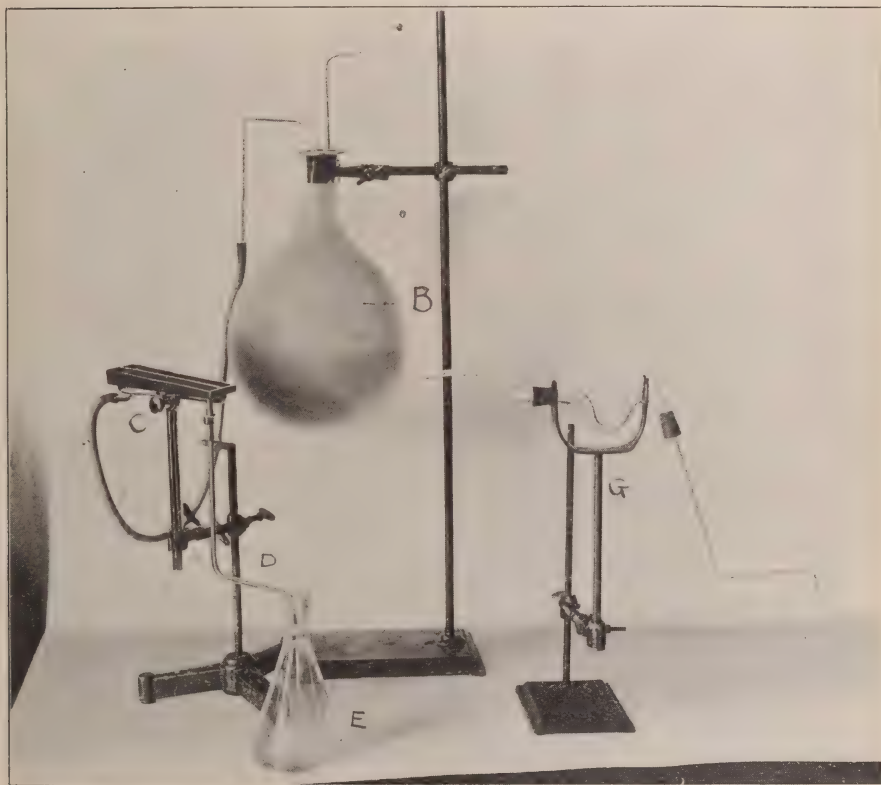


Fig. 1 (B).—Apparatus used with Ultraviolet Light Showing Special Trough and Tube.

During the operation of the arc, there was a large amount of heat generated which was shown by a rise from 24°C. to 117°C. in fifteen minutes, the bulb of the thermometer being 6 cm. from the source of light.

As may be partly seen in Fig. 1 (C), the liquids were exposed to the rays in a special, rectangular trough, $15\frac{1}{2}$ cm. x 4 cm., divided into two equal portions by a central septum. The fluid entered at one corner through a tube .5 cm. in diameter and bent at right angles, the trough at this point having a depth of 1.5 cm., but tapering at its other end to 0.8 cm. After flowing through one side, the liquid passed back to the other side by means

of a diagonal tube 0.7 cm. in diameter, which thus subjected it to a second exposure to the rays. From here, it passed out by means of the bent delivery tube (D) connected to the trough by a union. The whole arrangement was made of brass, heavily nickel plated, with rounded inside corners, allowing both trough and delivery tube to be sterilized by heating in the free flame. In addition to this the trough was provided in its center with a metal standard and an adjustable screw clamp, thus permitting it to be fixed in any desired position.

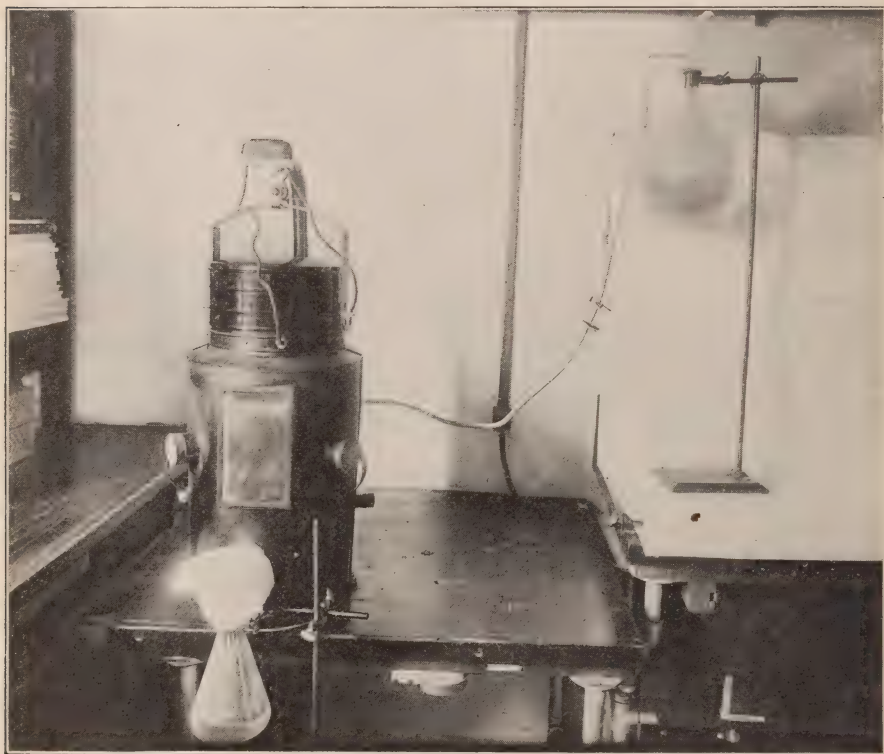


Fig. 2.—Complete Apparatus for Sterilization by Ultraviolet Light.

In most of the work on water the liquid was exposed to the rays in a special bent quartz tube as shown in Fig. 1 (G), provided with a brass holder and having previously sterilized glass inflow and outflow tubes connected through sterile rubber stoppers. As in the case of the trough, the quartz tube could be sterilized by heating in the free flame. It also permitted a greater rate of flow, but owing to the ease of breakage and difficulties in adjustment, the metal device was found to be much more satisfactory as well as economical.

The usual technique consisted in first running through the apparatus

about two litres of sterile water into a graduated cylinder. Not only did this serve as a means of regulating the rate of flow, but allowed the lamp to reach the optimum working conditions and, at the same time, cleaned the apparatus. Without breaking the sterile syphon, the material to be tested was now substituted in place of the water, and connected up as shown in Fig. 2. The liquids, after being exposed, were collected under aseptic conditions in previously sterilized containers, and portions removed to suitable vessels for bacteriological examination.

With the exception of the tap water, the bacterial suspensions and vaccines, *B. coli communis* was used as the test organism for determining the germicidal action of ultraviolet light on the various solutions studied. The inoculation was made in each case by adding to the material an aqueous suspension of the bacillus, shaking well for several minutes, and then estimating the number of bacteria present by plating out 1 cc. samples in various dilutions on suitable culture media.

B. The Action of Ultraviolet Light on Various Substances.

1. *Detroit Tap Water.* Our experiments with the city water supply were carried on during a time when the water was highly turbid, owing to melting ice and heavy winds. There was also a considerable amount of humus material present, giving the water a dark color.

The bacterial content of the water before exposure was obtained by plating out 1 cc. samples in plain agar, and incubating for forty-eight hours at 20°C. After exposure, 5 cc. samples of the treated water were examined. To make sure of the sterility of the media, controls were run at the same time with 5 cc. of sterile water. The results are given in summary in Table I.

The preceding table seems to establish that tap water with considerable matter in suspension and having a bacterial content of 800 organisms per cc., can be sterilized by exposure to ultraviolet rays in a quartz tube at a rate as high as a litre in thirty-eight seconds. Considering the price of electrical energy at 1½ cents per K.W.H., this means that 24 gallons can be sterilized in an hour at about 0.5 cent for cost of power. More data on the comparative cost of water sterilization by ultraviolet rays can be found in the recent studies of M. Recklinghausen (21), and I. J. Tanton (28).

As would be expected, if the flow of the liquid be slowed down, the heating effects of the lamp are noticeable as in Nos. 11, 12, 13, 21, 22, 23, 42, 43, 44. In fact, where the rate was a litre in forty minutes (Nos. 21, 22, 23), there was a rise of 34°C. in temperature during passage through the apparatus, giving a final temperature of 60°C.—almost sufficient to bring about a decided germicidal action through heat alone. This fact would be of importance in the case of sterilization of bacterial vaccines.

2. *Aqueous Suspensions of Bacteria.* The presence of *B. coli communis* in 0.1 cc. samples of the tap water used in our experiments brought up the

TABLE I.
ACTION OF ULTRAVIOLET LIGHT ON DETROIT TAP WATER.

	Number of Colonies before Exposure in 1 cc.	Flow in Minutes per Litre.	Number of Colonies after Exposure in 5 cc.	Rise in Temper- ature of Water.
1	650	Control	Control	
2	580	"	"	
3	520	"	"	
4	Sterile water	"	0	
5	As in 1, 2, 3	1.5	0	0
6	" " " "	1.5	0	0
7	" " " "	1.5	0	0
8	" " " "	4	0	0
9	" " " "	4	0	0
10	" " " "	4	0	0
11	" " " "	10	0	4°
12	" " " "	10	0	4°
13	" " " "	10	0	4°
14	500	Control	Control	
15	450	"	"	
16	470	"	"	
17	Sterile water	"	0	
18	As in 14, 15, 16	3.3	0	0°
19	" " " "	3.3	0	0°
20	" " " "	3.3	0	0°
21	" " " "	40	0	34°
22	" " " "	40	0	34°
23	" " " "	40	0	34°
24	800	Control	Control	
25	720	"	"	
26	730	"	"	
27	As in 24, 25, 26	0.63	0	0°
28	" " " "	0.63	0	0°
29	" " " "	0.63	0	0°
30	" " " "	0.72	0	0°
31	" " " "	0.72	0	0°
32	" " " "	0.72	0	0°
33	" " " "	1.0	0	0°
34	" " " "	1.0	0	0°
35	" " " "	1.0	0	0°
36	" " " "	2.1	0	0°
37	" " " "	2.1	0	0°
38	" " " "	2.1	0	0°
39	" " " "	4	0	0°
40	" " " "	4	0	0°
41	" " " "	4	0	0°
42	" " " "	14	0	12°
43	" " " "	14	0	12°
44	" " " "	14	0	12°
45	Sterile water	Control	0	

question as to the sterilizing action of the rays on pure cultures of this organism. Various aqueous suspensions of *B. coli communis*, ranging from 80,000 colonies per cc. to 777,000 per cc. were exposed to ultraviolet light at different rates of flow up to a litre in forty-two seconds. In each case,

5 cc. samples plated out on agar showed no colonies when incubated for three days at 37°C.

To ascertain whether equally efficient results could be obtained with a spore-forming organism, experiments similar to those with the colon bacillus were run with *B. subtilis* alone, and with mixtures of *B. subtilis* and *B. coli communis*, each in numbers of about 200,000 bacteria per cc. Complete sterility was obtained in every case, even with a rate of flow of a litre in thirty-nine seconds.

3. *Beef Bouillon*. The feasibility of sterilizing albuminous liquids by ultraviolet rays was studied with ordinary beef bouillon as used for cultural purposes. To decrease the content of albumins and make the color as light as possible, the bouillon was prepared without the ordinary 2 per cent. peptone, sterilized in streaming steam and then inoculated with *B. coli communis* in the usual manner. The various experiments and results obtained are given in Table II, based on 1 cc. samples on agar, incubated for twenty-four hours at 37°C.

It is easily seen from Table II that the Cooper-Hewitt mercury arc cannot be used for sterilizing bouillon, even with a rate of flow as slow as a litre in ten minutes. Ten minutes for a litre to flow through can be considered the slowest practical rate allowable. Beyond this point the heating effects of the lamp come into consideration.

As may be noted from Nos. 34-39, the percentage reduction (35 per cent. to 60 per cent.) was not so high with more bacteria present, than when bouillon containing less bacteria (Nos. 24-29) was exposed to the rays. In the latter case, not only was the reduction somewhat greater (55 per cent. to 65 per cent.) but was also more uniform. The bouillon, itself, also seemed to have a slightly burnt odor after exposure to the ultraviolet light.

4. *Bismarck Brown*. The fact that the bouillon was colored brought up the question as to the effect of color on the action of the rays. To determine this point, water was colored with Bismarck brown till it was equal in intensity to a dark bouillon. It was then infected with *B. coli communis* and run through the apparatus in the usual manner. With rates of flow as high as a litre per minute, complete sterilization took place. Control samples showed that there were about 250,000 organisms per cc. before exposure.

{ 5. *Sodium Chloride*.
6. *Saccharose*. Our experiments with tap water seemed to indicate that dissolved salts did not interfere with the germicidal action of the mercury arc. This fact was confirmed by exposing to the rays a 1 per cent., a 2 per cent., and a 4 per cent., aqueous solution of common salt, containing as high as 450,000 colon bacilli in every cc. The highest rate of flow was a litre per minute. In every case, 5 cc. samples of the liquid after exposure failed to show any organisms present.

That ionization of the dissolved material has no influence on the sterili-

TABLE II.
ACTION OF ULTRAVIOLET LIGHT ON *B. COLI COMMUNIS* IN BOUILLON
SUSPENSION.

	Number of Colonies before Exposure.	Flow in Minutes per Litre.	Number of Colonies after Exposure.
1	200,000	Control	Control
2	220,000	"	"
3	240,000	"	"
4	As in 1, 2, 3	10	*
5	" " " " "	10	*
6	" " " " "	10	*
7	" " " " "	7	*
8	" " " " "	7	*
9	" " " " "	7	*
10	Control on media		
11	500,000	Control	Control
12	510,000	"	"
13	490,000	"	"
14	As in 1, 12, 13	2.3	*
15	" " " " "	2.3	*
16	" " " " "	2.3	*
17	" " " " "	6	*
18	" " " " "	6	*
19	" " " " "	6	*
20	Control on media		0
21	18,000	Control	Control
22	20,000	"	"
23	21,000	"	"
24	As in 21, 22, 23	2	7,500
25	" " " " "	2	7,200
26	" " " " "	2	7,800
27	" " " " "	1.4	8,500
28	" " " " "	1.4	8,700
29	" " " " "	1.4	8,700
30	Control on media		0
31	750,000	Control	Control
32	730,000	"	"
33	710,000	"	"
34	As in 31, 32, 33	10	320,000
35	" " " " "	10	340,000
36	" " " " "	10	300,000
37	" " " " "	10	440,000
38	" " " " "	10	490,000
39	" " " " "	10	380,000
40	Control on media		0

*Indicates more than 1,000 colonies on plate.

zation was shown by experiments with saccharose—a typical non-electrolyte. A 4 per cent. aqueous solution of the sugar was employed,—the technique being exactly the same as in the case of the sodium chloride. Here also, we found it possible to sterilize with 400,000 *B. coli* per cc. present before exposure.

7. *Urea*. The results obtained with saccharose raised the question as to the effect of the presence of nitrogen on the sterilizing action, since saccharose is a carbohydrate. For this purpose, a 1 per cent. aqueous

solution of urea ($\text{CO}(\text{NH}_2)_2$) was infected with *B. coli communis*, the control plates showing 50,000 bacteria per cc. The organisms were found to be entirely killed with rates of flow up to a litre in two minutes. The action at more rapid rates was not studied, but, in all probability, complete sterilization would have been affected.

8. *Glycocoll*. The possible influence on the action of the rays of the simultaneous presence of carboxyl and amino groups in a molecule was studied with a 2 per cent. aqueous solution of the simplest amino acid,—glycocoll ($\text{H}_2\text{N}-\text{CH}_2-\text{CH}_2-\text{COOH}$). In spite of the large number of organisms used in infecting—4,200,000 per cc.—rates of flow of a litre in four, three, and two minutes, respectively, gave no growths when 5 cc. samples of the exposed solutions were plated out on agar at 37°C .

{ 9. *Leucin*.

{ 10. *Alanin (alpha)*. Our studies with leucin were undertaken to see whether the length of the molecule as well as its arrangement had any influence on its sterilization by ultraviolet light. Leucin (α aminoisocaproic acid) with the formula, $(\text{CH}_3)_2\text{CHCH}_2\text{CH}(\text{NH}_2)\text{COOH}$, is one of the more difficultly soluble higher amino acids. A 1 per cent. solution of the acid in water was used, and inoculated with the colon bacillus as usual, so that there were about 470,000 bacteria per cc. However, when exposed to the rays at the rate of a litre in four minutes, it was found impossible to sterilize it.

As may be noted from its formula, leucin has a methyl side chain in its molecule. To make sure that the interference was not due to this methyl group, experiments similar to those with leucin were run with a 1.5 per cent. solution of Kahlbaum's α alanin,—the simplest α amino acid having a methyl side chain, $(\text{CH}_3)_2\text{C}^*\text{H}(\text{NH}_2)\text{COOH}$. The number of organisms present before sterilization was about 2,000,000 per cc., and the maximum rate of flow was a litre in two minutes. In every case, the sterilization was found to be complete, showing that the methyl side chain had no influence on the action.

A test of the leucin solution used in our preceding experiments with Millon's reagent gave a distinct red color, showing the presence of proteins. Accordingly, another series of experiments was run with leucin, this time using Kahlbaum's highest purity product. The content of colon bacilli, as shown by control plates, was about 900,000 per cc. with a maximum rate of flow of a litre in two minutes. This time 5 cc. samples of solution after exposure failed to give any colonies on agar, showing that the poor results previously obtained were due entirely to protein compounds admixed with the leucin.

11. *Cocaine Hydrochloride*. The germicidal action of ultraviolet light on alkaloids was studied with 1 per cent. and 2 per cent. solutions of cocaine hydrochloride in water. One set of solutions was made up with sterile water and with *B. coli communis* as usual, while the other set was

made up with clear tap water, to which was added a mold (*Penicillium glaucum*).

In the series where the colon bacillus was used, the number of organisms present ranged from 19,000 per cc. to 160,000 per cc. before exposure to the rays. After the illumination, with a rate of flow of a litre in ten minutes, the number of bacteria remaining was from 200 in every cc. to several thousand per cc. With more rapid rates of flow, the number of organisms remaining ranged much higher.

Even at the slowest rates of flow, the solutions infected with the mold showed apparently no reduction in colonies after exposure to the rays. From the results obtained with cocaine, it would seem that the alkaloids, probably on account of their high molecular weight, do not permit of sterilization by the ultraviolet rays. Comparative tests of its anæsthetic properties on dogs before and after exposure to the ultraviolet light showed that the cocaine hydrochloride was not materially affected. Both with the bacteria and mold, the action seemed to be the same in the 1 per cent. as in the 2 per cent. solutions.

12. *Suspensions of Mold in Water.* The poor results obtained with the cocaine solutions containing mold brought up the question as to the action of ultraviolet rays on mold. For this purpose, aqueous suspensions of different species of *Penicillium*, *Aspergillus* and *Mucor*, were prepared, so that the number of colonies, when properly diluted and sown on alkaline agar, ranged from about fifty to several hundred per cc. When exposed to the rays at a rate of flow as slow as a litre in twelve minutes only a small destructive action was obtained. The percentage reduction was greater where there were more fungi present before exposure, but in no case did it exceed 20 per cent. The data obtained seemed to show conclusively that mold cannot be killed by ultraviolet light, except when present in very small amounts, as one or two colonies per cc.

13. *Milk.* In our studies on the sterilization of milk by ultraviolet light, we used a Jersey milk, rich in butter fat, and about twenty hours old. The laboratory results are given in Table III. Both plain (P. A.), and litmus-lactose agar (L. L. A.) were used as culture media. One cc. samples were plated out and incubated for forty-eight hours at 37°C. The red colonies, as seen on the litmus-lactose agar plates have been designated by (r), and are given together with the total number of colonies on the plate.

Confirming the results of Romer and Sames (5), and those more recent of Huyge (18), Ayers and Johnson (32), Table III shows that the ultraviolet rays cannot be successfully used for sterilizing milk. This would have been expected from our results with bouillon. Huyge believes that the difficulty in the sterilization of milk is due to the colloids present.

At the slowest possible rate of flow—a litre in ten minutes—the greatest reduction in bacterial numbers was about 45 per cent. (No. 11). Where the organisms were not so numerous (Nos. 14–21), a still greater reduction

TABLE III.

THE GERMICIDAL ACTION OF ULTRAVIOLET LIGHT ON MILK.

	Number of Colonies before Exposure in 1 cc., P. A.	Number of Colonies before Exposure in 1 cc., L. L. A. X 1,000	Rate of Flow in Minutes per Litre.	Number of Colonies after Exposure in 1 cc., P. A.	Number of Colonies after Exposure in 1 cc., L. L. A X 1,000.
1	204,000	75(37r)	Control	Control	Control
2	189,000	53(28r)	"	"	"
3	196,000	52(33r)	"	"	"
4	As in 1, 2, 3	As in 1, 2, 3	2	130,000	84(49r)
5	" " " " "	" " " " "	2	140,000	80(52r)
6	" " " " "	" " " " "	2	143,000	79(46r)
7	" " " " "	" " " " "	5	120,000	65(40r)
8	" " " " "	" " " " "	5	126,000	69(38r)
9	" " " " "	" " " " "	5	119,000	62(36r)
10	" " " " "	" " " " "	10	115,000	54(32r)
11	" " " " "	" " " " "	10	109,000	67(46r)
12	" " " " "	" " " " "	10	110,000	50(32r)
13	Control on Media				
14	26,000	8.4(6.1r)	Control	Control	Control
15	24,000	9.2(6.0r)	"	"	"
16	30,000	11.0(7.2r)	"	"	"
17	As in 14, 15, 16	As in 14, 15, 16	7	10,000	4.9(3.1r)
18	" " " " "	" " " " "	7	9,500	4.6(2.9r)
19	" " " " "	" " " " "	7	9,200	4.8(3.2r)
20	" " " " "	" " " " "	7	9,100	4.0(3.2r)
21	" " " " "	" " " " "	7	9,800	4.2(2.7r)

was obtained—the highest being almost 70 per cent. in No. 20. Macroscopical and microscopical examination of the colonies on the litmus-lactose agar plates, both before and after exposure to the rays, showed a preponderance of the *Bact. lactici acidi* group after exposure. A curious fact which can be seen from the table (Nos. 4–12) is that there were more colonies growing on the litmus-lactose agar plates after exposure than before.

It would seem, then, that exposure of milk to ultraviolet rays has a tendency to kill off the undesirable organisms present, leaving the more desirable bacteria of the *Bact. lactis acidi* group in the majority. There was no perceptible change in the taste of the milk after being illuminated.

14. *Wine*. Contrary to what might be supposed from the preceding work, it was found possible to completely sterilize wines by the ultraviolet rays. The wines used in our experiments were a Tokay and a Sherry, each containing about 16 per cent. alcohol, and both colored. On account

of the relatively high percentage of alcohol, the infecting organism in this case was a spore-forming bacillus of the *B. subtilis* group, already present in the Sherry wine when obtained. This bacillus was isolated in pure culture and was also used for infecting the Tokay wine.

The number of infecting organisms ranged from about 25,000 to several million per cc. as shown by plating out on dextrose agar at 37°C. The best rate of flow seemed to be about a litre in five minutes. Slower rates imparted a sort of burnt taste to the wines, while higher rates did not permit of complete sterilization. Confirming our results with Bismarck brown, the dark color of the Sherry wine did not seem to interfere with the germicidal action of the rays.

15. *Adrenalin Chloride Solution.* Our work with Adrenalin Chloride was mostly with a 1:3200 aqueous solution preserved with chloretone. Several experiments with solutions in which the chloretone had been removed seemed to indicate that sterilization was possible when the liquid was exposed to the rays at the rate of a litre in six minutes. *B. coli communis* was used as the test organism.

However, after exposure to the rays the adrenalin solutions showed a distinct red coloration, indicative of deterioration. Physiological assays by injection into the circulatory system of dogs, both before and after the illumination, showed that after exposure there is a loss of 30 per cent. in the physiological activity. The action is probably one of oxidation. More work with this substance is contemplated.

16. *Bacterial Vaccines.* Our previous work showed that ultraviolet light could be used to sterilize salt solutions. This suggested the use of the rays in the preparation of bacterial vaccines. As would be expected, the rate at which the vaccine is exposed to the rays is of the greatest importance, owing to the large number of organisms present. Where the number was fifty million or more per cc. the minimum rate at which we found complete germicidal action to take place was a litre in five minutes. With streptococci and the micrococci (staphylococci), slower rates were necessary to kill all of the organisms. A rate of flow of a litre in eight minutes seemed to be the most satisfactory for all of the vaccines studied.

In preparing the vaccines, the organisms were grown as usual on the appropriate culture media for the necessary length of time. The growth was then washed off with sterile physiologic salt solution, the bacterial numbers estimated by Wright's method, and the suspension diluted with sterile salt solution to give the desired number of organisms per cubic centimeter. After shaking for at least half an hour, in a shaking machine, the diluted suspension was exposed to the ultraviolet rays, and run directly into a sterile container under aseptic conditions. The preliminary shaking was found to be absolutely necessary with the streptococci, probably due to clumping of the organisms and thus escaping the action of the rays.

We have prepared in this way the following vaccines:

THE ACTION OF ULTRAVIOLET LIGHT ON VARIOUS SUBSTANCES.

Substance.	Number of Organisms per cc. before Exposure.	Rate of Exposure to Rays Minimum per Litre.	Number of Colonies per cc. after Exposure.	Changes Produced.
1. <i>Detroit tap water.</i> (Highly turbid).	400-800	38 sec.	Sterilized	None
2. <i>Aq. suspensions.</i> <i>B. coli communis.</i>	80,000-777,000	42 sec.	Sterilized	None
<i>B. subtilis.</i>	170,000-400,000	39 sec.	Sterilized	None
<i>B. subt. & B. coli.</i>	400,000	39 sec.	Sterilized	None
3. <i>Beef bouillon.</i>	18,000-750,000	1.4-10 Min.	7,500-490,000	Slight burnt odor
<i>B. coli com.</i>	250,000			
4. <i>Bismarck brown sol.</i>	<i>B. coli comm.</i>	1 Min.	Sterilized	None
5. <i>Sodium chloride, 1%, 2%, 4% aq. sol.</i>	48,000-450,000	1 Min.	Sterilized	None
6. <i>Saccharose 4% aq. sol.</i>	<i>B. coli comm.</i>	1 Min.	Sterilized	None
7. <i>Urea. 1% aq. sol.</i>	400,000			
8. <i>Gyccoll 2% aq. sol.</i>	<i>B. coli comm.</i>	2 Min.	Sterilized	None
9. <i>Leucin (impure) 1% aq. sol.</i>	670,000-4,200,000	2 Min.	Sterilized	None
<i>Leucin (Kahlbaum's Best) 1% aq. sol.</i>	<i>B. coli comm.</i>	4 Min.	Unsterilized	None
10. <i>Alanin (alpha) 1.5% sq. sol</i>	470,000	2 Min.	Sterilized	None
11. <i>Cocaine hydrochloride, 1% and 2% aq. sol.</i>	900,000	2 Min.	Sterilized	None
12. <i>Suspension of mold in water.</i>	<i>B. coli comm.</i>	10 Min.	200-2700 <i>B. coli comm.</i>	None
13. <i>Milk (Jersey).</i>	19,000-160,000	12 Min.	180 mold. 44-220	None
14. <i>Wines (Sherry and Tokay).</i>	200 mold. 50-260	7-10 Min.	9,100-143,000	None
15. <i>Adrenalin chloride sol. sol. (1:3200).</i>	24,000-240,000	5 Min.	Sterilized	None.
16. <i>Bacterial vaccines.</i>	(48 hour, 37° count) 25,000-2,900,000 (<i>B. subt. group</i>)	6 Min.	Sterilized	Burnt taste with rates faster than 5 min. Red Coloration 30% loss in physiologi- cal activity.
a) <i>Colon.</i>	60,000			
b) <i>Colon-typh.</i>	<i>B. coli comm.</i>			
c) <i>Colon (comb.)</i>				
d) <i>Strep. (")</i>				
e) <i>Staph. (")</i>				
f) <i>Gonorr. (")</i>				

1 Colon vaccine—50,000,000 bacteria per cc.

2 Colon-typhoid vaccine —100,000,000 bacteria per cc.

3 Colon vaccine (combined)—400,000,000 " " "

4 Streptococcus vaccine " — 50,000,000 " " "

5 Staphylococcus " " —500,000,000 " " "

6 Gonorrheal " " —900,000,000 " " "

Sterility was shown in each case by the absence of any growth when 5 cc. samples were sown in plain and dextrose agar at 37°C. Owing to the high turbidity and the very great number of organisms present, it was found necessary to use a rate of flow of a litre in ten minutes with the gonorrheal vaccine. Ascitic agar was used here to determine the sterility. All of the vaccines were preserved in the regular manner by the addition of 0.2 per cent. tricresol.

It is thought by some investigators that the usual method of preparing vaccines by heat impairs the keeping qualities and the power of producing antibodies. (Cf. Semple and Matson (27)). On the other hand, the excess of chemicals which might be required to effect sterilization may produce irritation. Theoretically, then, vaccines prepared by ultraviolet light should possess superior therapeutic action. A clinical study, using several vaccines so prepared, is being made with a view of determining this point. This, together with more researches on ultraviolet light sterilization, we hope to report upon in a future publication.

III. DISCUSSION.

Several theories have been advanced as to the mode of action of the ultraviolet rays. The hypothesis advanced by Glaser (14) seems to be plausible. He explains it on the photo-mechanical theory, that by the continued action of ether vibrations on the organisms, the number of vibrations is brought to a point of rupturing the chemical combinations.

We have noticed, in our own work, the formation of ozone during the burning of the mercury arc. This can be detected by the odor, or by the fact that strips of moistened potassium-iodide starch paper placed in the vicinity of the rays are turned blue. The theory has been advanced that the germicidal action of the rays is due to the formation of ozone or hydrogen peroxide. Oker-Blom (25), from recent ultraviolet light studies with a Nogier-Triquet mercury arc, concludes that the germicidal effects have no basis as being due to the action of nitrous acid, ozone or hydrogen peroxide. It must rather be considered as the direct action of short-wave rays on the living bacterial protoplasm. It may be possible that the action can also influence secondary chemical reactions taking place through the agency of ultraviolet light.

The fact that secondary chemical changes may be produced by the rays was seen from the change we found in the adrenalin chloride solutions after the exposure. Berthelot and Gaudechon (23) have found that the rays are able to decompose solutions of levulose, while acetone is partly changed to acetic acid. Massol (19) has found that under the action of ultraviolet, starch gradually loses its tinting power with iodine. More recently Euler and Ryd (22) have found that lactic acid undergoes, through the agency of ultraviolet rays, a splitting up which may be considered analogous to the fermentative cleavage of this acid. Similarly, carbon dioxide is split off from tartaric acid by the action of the rays, a reducing substance being formed at the same time.

As noted, particularly with the bacterial vaccines, turbidity rapidly decreases the germicidal action of the rays. However, as Oker-Blom (24) has also found with water, if the turbidity be not too high, it is still possible

to sterilize with decreased rates of flow. Our work with vaccines also showed that bacteria have a varying resistivity to the action of the rays. The streptococci and staphylococci were the most difficult to kill, while the spore forming types offered no apparent resistance. Confirming our own results, Oker-Blom finds that color due to Vesuvine does not materially affect the sterilization.

Considerable discussion has arisen of late in regard to the most efficient type of lamp from the germicidal point of view. Two general types of mercury arc sterilizers can be distinguished, viz.:

1. The "over-water" type or "non-immersed" type, where the arc is above the material to be acted upon. The Westinghouse-Cooper-Hewitt lamps, similar to the one used in our own experiments, are of this kind.

2. The "under-water" or "immersed" type, where the arc is immersed in the fluid to be illuminated. The Courmont-Nogier and Nogier-Triquet lamps are of this type.

Theoretically, the immersed type should be more efficient, owing to all of the rays being utilized, and the elimination of the intervening air space. On the other hand, the "over-water" type is more adaptable for acting on materials other than water. By burning at a higher temperature, it also produces a greater amount of the shorter or germicidal rays. For large-scale water sterilization, it would seem that the Nogier-Triquet type is more suitable, while for general, small-scale sterilization, the Cooper-Hewitt (non-immersed) type seems to be more efficient. An able discussion of this point is to be found in a recent article by Nogier (27).

IV. CONCLUSIONS.

A. The ultraviolet rays produced by the Cooper-Hewitt mercury arc have a strong bactericidal action.

B. Certain species of bacteria in aqueous suspension, including spore-forming organisms, are killed by exposure to the rays. Molds, however, are only partially destroyed by the ultraviolet light.

C. The action seems to be a photo-mechanical process, and is, in all probability, due to absorption of the ultraviolet rays by the bacterial protoplasm.

D. Water, wines, many inorganic, and a number of organic substances in aqueous solution, can be sterilized by ultraviolet light. Bacterial vaccines require a prolonged action.

E. Proteins and other bodies of high molecular weight interfere with the action of the rays. Turbidity, both organic and inorganic, has a similar action. Color, within certain limits, seems to have no influence.

BIBLIOGRAPHY.

1. *Cernovodeanu and Henri*, Compt. rend. de l'Acad. des sciences, 1910, V. 150, p. 52
2. *Billon and Daguerre*, Compt. rend. de l'Acad. des sciences, 1910, V. 150, p. 479.
3. *Urbain, Scal and Feige*, Compt. rend. de l'Acad. des sciences, 1910, V. 150, p. 548.
4. *Vallet*, Compt. rend. de l'Acad. des sciences, 1910, V. 150, p. 632.
5. *Romer and Sames*, Hyg. Rundschau, 1910, No. 16.
6. *Lesure, Jr.* de Pharm. et de Chimie, 1910, Ser. 7, pt. 1, p. 569.
7. *Cernovodeanu and Henri*, Compt. rend. de l'Acad. des sciences, 1910, V. 150, p. 729.
8. *Henri, Helbronner and de Recklinghausen*, Compt. rend. de l'Acad. des sciences, 1910, V. 150, p. 932.
9. *Vallet*, Compt. rend. de l'Acad. des sciences, 1910, V. 150, p. 1076.
10. *Courmont, Nogier and Rochaix*, Compt. rend. de l'Acad. des sciences, 1910, V. 150, p. 1453.
11. *Baroni, Cernovodeanu and Henri*, Compt. rend. de l'Acad. des sciences, 1910, V. 151, p. 724.
12. *v. Recklinghausen*, Gesundheits Ingenieur, 1911, V. 34, p. 116.
13. *Stassano and Lematte*, Compt. rend. de l'Acad. des sciences, 1911, V. 152, p. 623.
14. *Glaser*, Wiener klin. Wochenschr. 1911, No. 32, p. 1157.
15. Mitteilung aus der Kgl. Prüfungsanstalt für Wasserversorgung, 1911, V. 1, p. 85-102.
16. *Borinski*, Gesundheits Ingenieur, 1912, V. 35, p. 779.
17. *Clemesha*, Ind. Med. Gazette, 1912, p. 267.
18. *Huyge*, Annuaire de la Stat. agronom. de l'Etat a Gembloux, 1912,—Ministere de l'Agriculture et des Travaux publics Bruxelles.
19. *Massol*, Compt. rend. de l'Acad. des sciences, 1912, V. 154, p. 1564.
20. *Henri*, Compt. rend. soc. biol., 1912: a. V. 73, No. 26, p. 323; b. V. 73, No. 28, p. 319; c. V. 73, No. 28, p. 321; d. V. 73, No. 28, p. 326; e. V. 73, No. 28, p. 328.
21. *Recklinghausen*, Rev. d'Hyg. et de Police sanit., 1912, V. 34, No. 12, p. 1449.
22. *Euler and Ryd*, Biochemische Zeitschrift, 1913, V. 51, p. 97.
23. *Berthelot and Gaudechon*, Compt. rend. de l'Acad. des sciences, 1913, V. 156, No. 9, p. 707.
24. *Oker-Blom*, Zeitschr. f. Hyg. u. Infektskr., 1913, V. 74, pt. 2.
25. *Oker-Blom*, Zeitschr. f. Hyg. u. Infektskr. 1913, V. 74, pt. 2, p. 242.
26. *La Presse Medicale*, 1913, No. 32 (April 19).
27. *Nogier*, La Presse Medicale, 1913, No. 43, p. 613.
28. *Tanton*, Rev. d'Hyg. et de Police sanit., 1913, V. 35, No. 1, p. 1.
29. *Marinier*, Rev. d'Hyg. et de Police sanit., 1913, V. 35, No. 1, p. 24.
30. *Moycho*, Compt. rend. de l'Acad. des sciences, 1913, V. 156, No. 16, p. 1268.
31. *Henri and Bielecki*, Compt. rend. de l'Acad. des sciences, 1913, V. 156, No. 17, p. 1322.
32. *Ayres and Johnson*, Journ. of Washington Acad. of Sciences, 1913, V. 3, p. 160.

A SERIOUS FALLACY OF THE "STANDARD" METHYLENE BLUE PUTRESCIBILITY TEST.

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Spitta and Weldert's* methylene blue putrescibility test is employed as a routine procedure in this country to the almost complete exclusion of any other test of this kind. The test has been investigated in particular by Phelps and Winslow,† Clark and Adams,‡ and Jackson and Horton.§ Phelps|| has given the test a quantitative expression by the introduction of "relative stability" figures, which are intended to indicate the percentage of oxygen available to that required for the complete oxidation of a sewage or effluent. It is obvious that the introduction of this relative quantitative feature has added importance to the method.

According to Phelps and Winslow, the end-point of the test coincides fairly closely with the elimination of the nitrate and nitrite oxygen. However, study of the experimental work of the various investigators points to a wide range of variations permitted in the practical application of the test. This leads to the inquiry whether the interpretation of the reaction under all conditions could be one and the same or whether the efficiency of the test has been overestimated as applied at present. C. B. Hoover¶ shows in tabulated form the variations in the application of the test among sewage laboratories with reference to temperature and time of incubation and seal of bottle, which clearly demonstrates lack of uniformity. He makes no mention, however, of the varying quantities of methylene blue employed by different observers. Clark and Adams, in investigating the time required for the decolorization of a large number of dyes in sewage mixtures, found that the amount of dye used within reasonable limits is not important, since samples with twice the amount of dye introduced usually were decolorized in the same period of time. Weldert and Spitta called attention originally to the fact that the amount of methylene blue solution should be constant if a comparative expression of the method is desired. They also stated that the quantity of the methylene blue solu-

*Mitt. kgl. Prüfungsanst. Wasserversorgung, Heft 6, p. 160.

†J. Infect. Dis., Suppl. 3; May, 1907.

‡J. Am. Chem. Soc., Vol. 30, p. 1037.

§J. Ind. Chem. Eng. Vol. 1; June, 1909.

||Contr. Sanit. Research Lab. and Sewage Exp. St., Vol. 5, p. 74.

¶Eng. News, Vol. 68, p. 452.

tion should be just low enough to give to the liquid a noticeable blue color. The amount which they added was 0.3 cc. of a 0.05 per cent. aqueous methylene blue solution (B. extra Kahlbaum) to 50 cc. of the liquid to be examined. Jackson and Horton found that variations in the amount of coloring matter used result in noticeable difference of the time required for the decolorization on account of the slight antiseptic action of the dye. Therefore, they also recommended the use of as little of the dye as possible. The quantity they applied was 1.0 cc. of a 0.05 per cent. watery solution to 250 cc. of the liquid to be examined.

I have recently been led to look into this point somewhat closer in connection with an investigation of the "Relation of the Nitrates to the Putrescibility of Sewages,"* and I was surprised to find how widely differing results can be obtained by varying the quantity of the dye. Indeed, the results obtained were so striking as to clearly call for an adjustment of the point in question if the test is to be retained as a fairly accurate expression of the relative oxygen requirements of a sewage, effluent, or contaminated water.

The amount of methylene blue employed by the various observers has been recorded as follows:

	Methylene blue solution.		Capacity bottle.	Cc. of 0.05 per cent. methylene blue sol. calc. per 150 cc. bottle cap.
	cc.	Per cent. strength.		
Spitta and Weldert.....	0.3	0.05	50	0.9
Jackson and Horton	1.0	0.05	250	0.6
Phelps and Winslow	1.0	0.10	250	1.2
St. meth. of water analysis	1.0	0.05	150 to 200	1.0 to 0.75

From this tabulation it appears that the amount of 0.05 per cent. methylene blue solution varies from 0.6 to 1.2 cc. per 150 cc. bottle capacity. The "Standard Methods" permit variations of 25 per cent. in the quantity of the dye. I have made no systematic inquiry into the exact proportions used by the various laboratories in this country. However, I have had sufficient opportunity to satisfy myself that generally little stress is laid on a definite ratio of methylene blue solution and bottle capacity.

At first, I was inclined to look to the brand of the dye employed as the cause of discrepancy, but repeated comparative tests carried on with four

*J. Infect. Dis., Vol. 13, No. 2.

TABLE I.

COMPARISON OF FOUR BRANDS OF METHYLENE BLUE.

Cc. m. bl. sol. per 130 cc.	Relative stability obtained with methylene blue from											
	M.	G.	H.	W.	M.	G.	H.	W.	M.	G.	H.	W.
0.25	9	9	8	9	.....	.....	.....	.....	9	9	9	9
0.50	15	15	15	15	19	19	19	19	11	11	11	11
0.75	17	17	17	17	22	22	23	22	12	12	12	12
1.00	.....	.....	.....	.....	25	25	25	25	17	16	17	17

different brands of the dye gave always identically the same results. There was evidently no noticeable difference in the germicidal effect of the brands which I compared.

The four brands were:

Methylene blue (double-zinc salt), Weiler-ter Meer Co.

Methylene blue, B.B. Conc. Farbwerke Hoechst Co.

Methylene blue, Mercks Medicinal, Highest Purity.

Methylene blue, Gruebler.

A 0.05 per cent. watery solution was prepared of each of the above brands and varying quantities of the solution added to bottles holding exactly 130 cc. of a sewage mixture. All of these samples and the samples in all of the following experiments were incubated at 20° C. The result of this comparative test can best be noted in Table I.

TABLE II.

TESTS ON RIVER WATER TO SHOW VARIATIONS OF STABILITY WITH CONCENTRATION OF METHYLENE BLUE.

Cc. meth. bl. sol. per 150 cc. capac.	Relative Stabilities.									
	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.
0.30	24	21	22	16	20	22	25	.....	.....	.....
0.55	.....	.....	.....	.....	.....	.....	.....	43	21	21
1.00	77	75	64	35	39	98	65	56	36	34

M. represents the Merck, G. the Gruebler, H. the Hoechst, and W. the Weiler-ter Meer brand. A larger number of such tests not recorded here have been made with essentially the same result.

This point being settled, I choose the Weiler-ter Meer brand for all my further work. These tests brought out clearly the fact that the relation of the concentration of the dye to the bottle capacity is of great importance. I had noted this on several previous occasions while working with a polluted river water. Some of the results obtained with river water are given in Table II.

Apparently there is no definite ratio between the stability figures and the different amounts of the methylene blue solution. However, a river water as a rule contains more or less colloid in the form of finely divided clay which may eliminate the color wholly or partly through adsorption. This phenomenon makes it very difficult at times to obtain reliable results, since the dye appears only as a precipitate at the bottom of the bottle. If there is much coarse sediment present in addition, the blue precipitate cannot be observed at all. The supernatant liquid may be completely colorless, yet a water of this kind is very likely to show a relative stability of 100. In many cases, good results may be obtained by permitting the colloidal matter to floc together and settle to the bottom, before adding the methylene blue solution. The coloring matter if added with a pipette will readily diffuse, without any mixing by shaking. The loss of a few hours in the time required for the decolorization of the sample may be of little importance, inasmuch as the relative stability of river waters as a rule is fairly high. With experience, it is possible to obtain fairly close results by noting the decolorization of the sediment at the bottom of the bottle, provided no other dark sediment be present, either sludge or algæous growth. Of course if an excess of the dye is added, part may be retained in solution in such waters. But in the light of my observations, such a procedure would furnish entirely erroneous results. One might just as well omit the actual test and hazard a guess on the result. It is very likely that an adsorption, such as that spoken of, occurs more or less with all surface waters unless they be entirely devoid of colloids. An adsorption may be hardly noticeable, yet it may be just sufficient to make the sample appear putrescible to the casual observer while in fact it may be non-putrescible.

Table III shows the results obtained with various mixtures of sprinkling filter effluent. This table represents but a few results, selected at random from the large number obtained.

This table shows that appreciable differences may occur in the relative stabilities, if 1.00 cc. and 0.70 cc. of the methylene blue solution are used, yet the "Standard Methods" permit such variations. The variations

become more marked with the variation in the amount of coloring matter employed.

Many factors enter into the process of the formation of the leuko-base in the methylene blue putrescibility test. Therefore, it cannot be expected that this complicated reaction will always work out with mathematical precision. It is generally conceded that the reaction coincides fairly well with the disappearance of the nitrate- and nitrite-oxygen, but the following argument would suggest itself. If a certain sewage mixture shows a relative stability figure of 35 with 1.00 cc. of the coloring matter and only 26 with one half of this coloring matter, one or the other of these figures must be wrong. The elimination of the available oxygen must have been evidently retarded by the germicidal properties of the dye, as has been

TABLE III.

VARIATIONS IN RELATIVE STABILITY NUMBERS WITH CONCENTRATION OF METHYLENE BLUE.

Cc. m. bl. sol. per 150 cc. cap.	Relative Stabilities.														
	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.	N.	O.
1.00	22	26	95	41	27	86	18	35	....	71	92	46	28	27	25
0.85	21	25	94	35	25	84	....	....	....	....	....	....	....	....	....
0.70	20	22	87	32	22	77	16	....	....	....	....	....	....	....	....
0.55	....	....	....	....	....	....	14	....	....	....	....	....	....	....	....
0.50	....	....	....	....	....	....	....	26	22	....	84	....	....	....	....
0.40	....	....	....	....	....	....	....	25	19	64	....	29	19	18	17
0.30	....	....	....	....	....	....	....	22	16	59	82	....	....	....	....

pointed out by Weldert, Spitta, Jackson and Horton. Now the question arises: How much of the methylene blue should we add to make the test indicate the elimination of the nitrate and nitrite oxygen and without influencing the time through any germicidal action of the dye.

For this purpose a series of tests was arranged in which the time of decolorization was recorded on one and the same sewage mixture, when different quantities of the coloring matter were employed. A series of bottles containing the same sewage mixture, without dye, however, were likewise incubated at 20°C. and the nitrates as well as nitrites determined in one of the "blank" bottles whenever the blue color disappeared in one of the putrescibility bottles. In this way it was deemed possible to come fairly close to the actual amount of dye indicating the elimination of the avail-

able oxygen. Table IV shows the results obtained. "Crsp. min. n." indicates the corresponding nitrate-nitrite oxygen in ppm. of nitrogen in the "blank" bottles.

TABLE IV.

VARIATION OF END POINTS IN NITROGEN WITH CONCENTRATION OF METHYLENE BLUE.

Cc. m. bl. sol. per 150 cc. cap.	A.		B.		C.		D.		E.	
	Rel. st.	Crsp. min. n.	Rel. st.	Crsp. min. n.	Rel. st.	Crsp. min. n.	Rel. st.	Crsp. min. n.	Rel. st.	Crsp. min. n.
1.00	22	1.00	26	0.16	95	0.06	27	0.08	18	0.06
0.85	21	0.07	25	0.10	94	0.07	25	0.08	16	0.05
0.70	20	0.08	22	0.10	87	0.01	22	0.17	16	0.06
0.55	.....	.....	.....	.....	.....	.....	.....	.....	14	0.06
1.00	.....	.....	71	0.05	.....	.....	.....	.....	.....	.....
0.85	20	0.05	.....	.....	.....	.....	.....	.....	.....	.....
0.70	18	0.06	.....	.....	.....	.....	.....	.....	.....	.....
0.50	16	0.05	.....	.....	25	0.11	.....	.....	.....	.....
0.40	.....	.....	64	0.01	22	0.07	16	0.15	21	0.14
0.30	.....	.....	59	0.03	21	0.10	15	0.61	16	0.26
0.40	19	0.46	75	0.13	21	0.08	20	0.09	19	0.19
0.30	16	1.36	60	0.32	16	1.57	16	0.88	16	0.92
0.40	19	0.18	25	0.19	22	0.01	21	0.08	19	0.07
0.30	16	0.40	16	1.10	20	0.08	16	1.57	16	0.37

The initial mineral nitrogen (nitrate-nitrite-oxygen) varied as a rule from 1 to 5 ppm. I believe that the tabulated results point to the conclusion that if 0.4 cc. of the methylene blue solution is used the mineral nitrogen at the time of decolorization has practically disappeared. The shorter time required by the use of 0.3 cc. of the coloring matter does permit the retention of larger quantities of the nitrate-nitrite oxygen. It is also noteworthy that a certain small residual mineral nitrogen is left even if the time of exposure be extended beyond the time occupied by the decolorization of 1.00 cc. of the methylene blue. For all practical purposes such a small quantity is immaterial since the oxygen available from it is likewise extremely small. The small quantity retained might possibly be due to the limitation of the method employed for the determination of the nitrates (aluminum reduction method as given in the "Standard Meth-

ods of Water Analysis"). Strict precautions were taken to prevent the introduction of working errors, and "blank" tests were frequently made on the reagents.

To demonstrate still further the inhibiting effect upon the denitrifying bacteria, a series of experiments was arranged, using sewage-sprinkling filter effluent mixture in four bottles of 150 cc. capacity each. One contained 0.4 cc. of the methylene blue solution, the others 1.0 cc. each. The time of decolorization of the 0.4 cc. bottle was noted as closely as possible and the nitrates, as well as the nitrites, determined in one of the 1.0 cc. bottles at the same time. A "blank" test was made under the same conditions with 150 cc. of distilled water containing 1.00 cc. of the coloring matter. The nitrites were not determined separately but together with the nitrates and the sum expressed as "min. n." (mineral nitrogen) in Table V. Of the residual two putrescibility bottles containing 1.00 cc. of the methylene blue solution, one was examined for residual nitrate-nitrate after a certain time interval (figures in parenthesis in Table V), the same determination being made on the other at the time of decolorization. Table V shows the results obtained:

TABLE V.

	A.	B.	C.	D.	E.	F.	G.
Min. n. in ppm. at start.	3.38	3.75	3.77	2.96	4.46	3.26	2.30
Time of decol. with 0.4 cc. m. bl. in hours	36	20	18	21	25	20	24
Min. n. in ppm. remaining in 0.4 cc. bottle	0.11	0.33	0.26	0.08	0.42	0.06	0.23
Min. n. in ppm. at the same time in 1.00 cc. bottle.	0.57	2.14	1.08	1.12	2.43	2.15	1.27
Min. n. remaining in 1.00 cc. bottle after — hours.	0.13 (47)	0.77 (27)	.....	.....	0.12 (32)	.....	0.48 (36)
Min. n. remaining in 1.00 cc. bottle at time of decolorization. . . . .	..... (64)	.....	0.06 (24)	0.10 (34)	.....	0.12 (31)	0.11 (52)

A good many of the results were necessarily lost for the reason that the blue color went during the night. This constituted the main difficulty throughout and approximately three fourths of all the tests had to be discarded. Table V shows conclusively the retarding influence which 1.00 cc. of the methylene blue solution has upon nitrate reduction. When the mineral nitrogen was nearly gone in the 0.40 cc. bottle it was still persistent in considerable quantities in the 1.00 cc. methylene blue bottles.

All of these samples were incubated at 20° C., and beyond a few tests no detailed study has been made of the results obtainable with various quantities of the dye on incubation at blood temperature. The few tests which have been made, however, have convinced me that relatively the same discrepancies may result.

The use of 0.40 cc. of the 0.05 per cent. methylene blue solution in 150 cc. of the liquid to be examined is sufficient for the purpose of observing the decolorization clearly, unless adsorption takes place, in which case the decolorization of the precipitate must be watched.

It must be conceded that the observations recorded here hold good only for the brands of the dye employed by me. It is possible that other brands vary in their germicidal properties. In the light of my observations, this is a factor of great importance if the interpretations of the results obtained with this method are to be of service. Even in one and the same laboratory employing a definite concentration of methylene blue an appreciable mistake may be introduced by employing putrescibility bottles of varying capacity. I have often found one and the same factory lot of four-ounce bottles to vary between 110 and 137 cc. or 24 per cent. That such differences may give rise to differences in the result is clear. All of the "relative stability" figures obtained lately in the laboratory and field work of the Sanitary District of Chicago are based upon 20° C. incubation in 150 cc. bottles containing 0.40 cc. of a 0.05 per cent. aqueous methylene blue (Weiler-ter Meer Co.) solution.

In view of the importance of the test, I would recommend that the Committee of the American Public Health Association on Methods for the Chemical Analysis of Water and Sewage investigate the matter as presented in this paper. The concentrations of the methylene blue solution permitted by the "Standard Methods of Water Analysis" at present are undoubtedly too high. Only one definite concentration should be made "standard."

REPORT OF COMMITTEE ON INDUSTRIAL HYGIENE AND SANITATION IN THE HOME.

J. H. LANDIS, M. D.,

Chairman.

Read before the Section of Public Health Officials, American Public Health Association, Colorado Springs, September, 1913.

The Committee on Industrial Hygiene and Sanitation of the Home approached the subject with rather an indefinite and hazy idea of just what such a report should contain.

Feeling that a collection of state and municipal laws concerning the subject would be a wicked waste of time and effort and that information concerning them, when desired, can be obtained readily by correspondence, no attempt has been made to assemble them.

Each industry presents a sanitary problem differing slightly or radically from every other industrial sanitary problem, according to the nature of the work done.

Trades are often erroneously held responsible for diseases having their origin in conditions entirely outside the trade in question.

It is perfectly apparent that legislation directed to the trade itself would fall far short of achieving the desired result.

The workman, the employer, and the public are all vitally interested in maintaining the highest degree of good health in all of the trades. Inefficiency due to poor health reduces the workman's wages, cuts the profits of his employer, and imposes additional burdens on the taxpayer.

Arguments based on a knowledge of the bacterial causes of disease too frequently fall on deaf ears. People are very slow to believe what they cannot see. For this reason, arguments clothed in terms of dollars reach the workman, the employer and the taxpayer with equal force.

Three years ago, after a study of local conditions in Cincinnati, it occurred to me that in organized labor could be found an instrument for the dissemination of facts concerning industrial hygiene. Coöperation was solicited in a series of addresses given before central labor organizations. In the beginning the response was feeble, and the infant organization passed through the traditional hard second summer.

The primary object of the organization was to correct conditions in workshops and factories, which are recognized as contributing factors in the development of tuberculosis.

Other insanitary conditions inside and outside of workshops and factories, as well as those contributing to the tuberculosis problem, now engage

our attention, and we have succeeded in bringing about many improvements.

These improvements have been reported back to the unions and have served to arouse interest and enlist their hearty coöperation.

The feeble infant has developed into a husky youngster that, under the name of the Sanitarians of Organized Labor, meets the second and fourth Sunday of each month in the office of the health officer. New complaints are received, and reports on old complaints are furnished by the department. Complaints received on Sunday are investigated on Monday and, if found correct, orders are issued for their abatement.

Employers of labor have become interested in the work, and radical reforms in method and time of sweeping, ventilation, spitting on the floor, light, toilet facilities, common drinking cups, etc., have been brought about.

Reports of sick and death benefits are solicited and analyzed, and the heavy financial drain due to preventable causes explained to the men.

An epidemiological study of tuberculosis in shoe workers, covering a period of five years, revealed startling facts as to how and why the victims contracted the disease and how it can be avoided in the future. Arrangements are being perfected with all of the proprietors of shoe factories in the city for a meeting with the health officer. Detailed sanitary reports on each factory will be submitted, and we have the assurance of men in the business that all of our recommendations will be followed.

We are working for medical inspection of all employees and, while not yet successful in obtaining it, we have reason to believe that it will come in a short time. The objections against it are that it means taking infectious men who are still able to work from their jobs, and the payment of sick benefits to their families.

The employment of a visiting nurse has also been urged, but up to date nothing has been accomplished.

Wherever possible, departments of health should employ one or more trained men for the epidemiological study of tuberculosis and industrial hygiene. To the question that may be asked as to the results obtained, I can answer in the words of one of the delegates when he declared in open meeting that the organization had done more to improve sanitary conditions during its short existence than had all of the unions combined before.

After four years of public health work, it appears to me that the plan promises more in the way of actual accomplishment than any other one with which I am familiar.

Sanitation of the home involves so much knowledge of a technical nature, that I am appalled when I approach the subject.

People inherit their ideas concerning ventilation, baths, cooking, heating, dressing, sewage disposal, etc., very much as they do their political and religious affiliations.

The hope of the country is in the coming generation. Removing fallacious ideas about home sanitation, that have been handed down from the stone age, is very much like removing stumps from a recently cleared piece of forest and is a job requiring dynamite and giant stump pullers.

When a visiting school nurse comes back with the report that the mother of a verminous child has insisted that lice are healthy and that the skinny physical condition of the nurse is in all probability due to the fact that she has failed to avail herself of their tonic qualities, one gets a fleeting glance at the problem confronting the man who tries to make a dent in the understanding of the passing generation.

Too often our appeals are aimed at people who by reason of their age are sunk in habit and tradition's hopeless rut.

The place to teach home sanitation is in the school room. Proper sanitary living is as much a habit as is whiskey drinking or tobacco smoking.

The sanitary habit should be cultivated during the most impressionable period of life, and that period is during infancy and early adolescence. Every little red schoolhouse should be a school of sanitary instruction. Children have the idea that their school teacher is more than human—an exaggerated idea, perhaps, in some few isolated instances, but one that can be turned to good account in sowing the seeds of right living.

The text-books offer a splendid field for instruction, and the time is not far distant when those classics in school literature, "Ned, can you hop?" and "What is in the nest?" will give way to epigrammatic statements concerning the value of fresh air, the danger of the common drinking cup and the roller towel, the importance of a pure water supply, the relation between sewage and disease, the contributing influence of alcoholic indulgence in the development of tuberculosis, etc.

For centuries, courts have been busy in curtailing the powers of the state and widening what is popularly known as the personal liberty of the individual. One of the results is that dependency and delinquency are the sole inheritance in some families.

The old saying that a man's home is his castle should hold good only when by correct living he eliminates himself as a menace to his neighbors.

The safety of the mass is of greater importance than the personal liberty of the individual.

Habits of living which are followed by an army of diseased, delinquent and dependent people, endanger the public health of a community and increase the burden of taxation should be regulated with an iron hand.

We have laws compelling the presence of certain sanitary appliances in homes, but are all but helpless in attempting to regulate the habits of life of those living in those homes.

Self-preservation demands a radical revision of the definition of personal liberty in order that future generations shall not come into the world

chained to a corpse; it demands a radical change, giving the state the power to correct an environment that has left its wrecks through a series of generations and produced a stock that is constantly threatening to vitiate what, in comparison, is pure blood.

Sanitation of the home is the unit which determines the general level of the sanitation of the state.

Power to regulate water supply and sewage disposal or to vacate or destroy property unfit for habitation helps materially in improving the sanitation of the home, but it fails to reach that class of people whose personal habits render any home unfit for occupancy.

One of the great difficulties in bringing about improved sanitary conditions in the home is due to the fact that too much has been left to volunteer social workers. The maximum of benefit can only be achieved when trained sanitarians are employed by departments having behind them the full power of the state. Untrained social workers too often confuse cause and effect. It is perfectly obvious that efforts directed at end results are worse than wasted and that a suggestion from an unofficial source lacks the force of a peremptory order from an official one.

To be of the greatest benefit, the workers should be physicians and graduate nurses. The sanitary engineer's training is not sufficiently broad to qualify him for this work.

To bring about the best results in sanitation of the home, it appears that three things are necessary:

I. Teaching hygiene and sanitation in the schools throughout the entire school age.

II. The employment of trained sanitarians on full time, who are officially a part of the health department.

III. More power to enter private homes for the purpose of correcting conditions which not only endanger the moral and physical welfare of the present generation but actually place a mortgage on future generations.

September 4, 1913.

REPORT OF THE COMMITTEE ON THE STUDY AND PREVENTION OF COMMUNICABLE DISEASES.

Read before the Section of Public Health Officials, American Public Health Association, Colorado Springs, September, 1913.

No great advances in methods of control of communicable diseases have been made during the year.

The new isolation hospital, which is building at Jacksonville at which the principles of aseptic nursing are to be carried out, marks another step toward the acceptance of the theory of the transmission of infection by contact rather than by means of fomites; a theory which your committee strongly advocated in its report in 1911.

Evidence is accumulating that infection in scarlet fever is not transmitted by the scales of desquamation and more attention is being paid to the buccal and nasal discharges as the means of transmitting infection.

No more work has been done in regard to prophylaxis in this disease by means of autogenous vaccines, a procedure which gave promise of a certain amount of value at the time of the last report.

There is still great divergence of opinion among health officers as to the length of time that a patient should be held in isolation in scarlet fever, and the measures to be taken before his release, although there seems to be a growing tendency to relax the restraint imposed upon the well adult members of the family.

In typhoid fever there can no longer be any question in regard to the protective value of anti-typhoid inoculation, and the chief interest now centers in the duration of the protection afforded by it.

While there is some evidence that the immunity, as shown by a positive Widal reaction, seems to persist as long as four or five years after the protective inoculation, the weight of evidence seems to show that three years is as long as it is safe to count upon immunity.

It has seemed to your committee that the question of carriers in communicable disease is one of great importance at the present time, and also one the proper solution of which presents great difficulties.

The carrier has been demonstrated in diphtheria, typhoid fever, cholera, cerebro-spinal meningitis, etc., and it is fair to suppose that it exists in many others where it has not as yet been demonstrated.

Thus, in scarlet fever, many cases which seem inexplicable by ordinary methods, can easily be explained if we accept the theory of a carrier.

Cases which have been released from isolation, apparently absolutely

free from disease, may leave a trail of cases which can be explained in no other way.

There is great diversity of opinion in regard to the proper manner of dealing with carriers, and also a number of practical points to be solved.

A man who has a frank, undoubted case of communicable disease is comparatively easy to deal with, and if he fails or refuses to follow out the orders of the board of health can be punished, but it is far different with a carrier.

It is sometimes very hard to convince a man, who feels perfectly well, that he should have his liberty restrained because he is or may be a menace to others, and it is also hard to convince a court that the orders of a board of health are necessary and reasonable when we try to enforce them against a carrier.

If it can be shown that the case is directly responsible for other cases the task may be easier, but it is not always possible to do this.

Your committee has attempted to collect and present some facts in regard to diphtheria carriers in the hope that some method of control in such cases could be formulated.

There is a large number of observations in regard to diphtheria carriers and the percentage of well persons found who show positive cultures varies greatly; depending in great measure upon how recently the subjects have been exposed to possible contact, upon the prevalence of diphtheria in the community, upon how carefully the observations have been made and many other factors.

The percentage of virulent cases among carriers differs widely also, and apparently observations in regard to this phase of the question have not been so carefully worked out.

There can be no doubt that the diphtheria carrier can be held responsible for a certain number of cases of clinical diphtheria and that he is a very real menace.

Like the typhoid carrier, the diphtheria carrier may be intermittent, showing a positive culture at times, followed by periods when the cultures are negative.

In 1902 the committee on diphtheria bacilli in well persons, appointed by the Massachusetts Association of Boards of Health, reported that out of 3,096 persons examined, 1.39 per cent. showed a positive culture. This number included only those persons who had not been recently exposed to diphtheria infection, as far as known, and only those whom the committee considered to have typical diphtheria bacilli, viz., "A" "C" or "D" of Wesbrook's types, in the throat or nose or both, were classed as positive.

In addition to the above 1,154 other persons were cultured, many of whom had been recently exposed to infection or were residents of localities or institutions where diphtheria has been recently present. If these persons

are included the percentage of persons infected would be raised to 2.89 per cent.

In order to discover as far as possible what is the present practice in regard to diphtheria carriers and also the methods in vogue in regard to clinical cases, your committee drew upon a *questionnaire* covering these points. Copies of this *questionnaire* were sent to cities in every country represented in the American Public Health Association.

In all 189 copies were sent to cities of every class recognized by the United States Census Bureau and to corresponding cities in Canada, Mexico and Cuba. Eighty-three replies were received, showing a great variation in the methods of dealing with cases of diphtheria and possible carriers.

Four cities that replied have no rules governing the control of communicable diseases and leave the whole matter to the attending physician.

Of those cities which have rules, sixty-eight require cultures to be taken to determine the end of isolation in diphtheria, while eleven have no such requirement, but do have a fixed minimum period of quarantine.

In two of these cities, if it is desired to terminate the isolation before the end of the fixed period, cultures may be taken, and the patient released on a negative result.

Fifty cities take release cultures from the patient alone, and eighteen take them from all the members of the family.

Thirty-eight require the release cultures from both nose and throat, and thirty from the throat alone, except in nasal cases.

There is slightly less variation in the number of negative cultures required for release, forty-nine requiring two successive negatives at least twenty-four hours apart, while nineteen are contented with one only.

The treatment of the well members of the family varies widely, and varies also with the occupation.

Twenty-eight cities say that all the well members of the family are segregated, although it appears that this rule is somewhat relaxed in some places if they leave the house and live elsewhere, and show a negative culture.

The other fifty-one cities allow a certain amount of freedom to the well members, depending somewhat upon the occupation.

Thus, physicians are allowed to pursue their usual vocation in forty-seven cities, clergymen in thirty, teachers in ten only, other professional men, in thirty-seven.

Handlers of milk and food are absolutely prohibited from continuing their work in all but six cities, and in those they must leave the house.

Salespeople may work in thirty-two cities, mechanics in thirty-seven and laborers in forty, while in all the replying cities, school children are excluded from school during the continuance of the disease, if they remain at home.

Of the fifty-one which allow the other members of the family to continue their work, twenty-three require preliminary negative cultures. Apparently in these cases the cultures must be taken from both nose and throat, twenty cities requiring one negative culture from each, while three require two.

Where more than one family occupies the house, twelve cities require a negative culture before allowing persons other than those in the family to go out, while the others impose no restraint.

Not all of the cities replying answered the questions in regard to the management of school children, leaving it to be inferred that the board of health does not control school inspection.

Thus, sixty-five only replied to the question, "Do the school inspectors take cultures from all sore throats no matter how mild?" Thirty-one replying affirmatively, thirty-one negatively and three replying "sometimes."

In case of an outbreak, forty-five culture all the children in the room, sixteen do not and in four it depends upon conditions.

Seven make periodic examinations of school children to detect carriers, while fifty-eight do not.

The measures taken to control carriers vary very widely, fifty-six of the replying cities treating a carrier practically as a case of clinical diphtheria, by placarding the house, etc., although some make the placard read "Diphtheria Carrier" instead of "Diphtheria."

Of the other replying cities, three make virulence tests, releasing the non-virulent cases, while the remainder do practically nothing.

Only two cities attempt to make a distinction between a carrier who has recently had the disease and one who has not.

When a carrier has been found sixty cities advise the use of the usual anti-diphtherietic treatment, such as the administration of antitoxin, using antiseptic sprays, etc., to hasten the cure of carriers, while five advise the use of the staphylococcus spray.

This latter method seems to be growing in popularity and apparently has the effect of shortening the period of positive cultures, although, in looking over the published reports of treatment by this method, it appears to be not entirely free from objection.

From this hasty summary of replies, it is very evident that, even in a disease as fully studied as diphtheria, there is a great lack of agreement as to methods of control of clinical cases, and that the question of the control of carriers is even more confused.

A number of suggestions as to methods of control of carriers were made especially among school children, but none of them appear to be practical. Thus it would be impracticable to take periodic cultures of all school children for such a purpose, or even to make a daily routine examination

of the throats of all children in the schools, culturing such as appear suspicious.

Your committee believes that a distinction should be made between carriers who have recently been exposed to diphtheria and those who have not.

In the report of the committee on diphtheria bacilli in well persons, already referred to, the following conclusions were reached: first, "It is not practicable to isolate well persons infected with diphtheria bacilli, if such persons have not, so far as known, been recently exposed to the disease, and, second, "It is not advisable as a matter of routine to isolate from the public all the well persons in infected families, schools and institutions."

Your committee can see no reason for offering at the present time any conclusion differing from these, and would request more time in order to make a further study of the best methods of controlling persons who have been recently*exposed to infection.

FRANCIS GEORGE CURTIS, *Chairman*,

JULIO F. ARTEAGA,

CHARLES V. CHAPIN,

S. D. RAWLINGS.

BOOK REVIEWS.

Nerves. By David F. Harris. (No. 74 in *The Home University Library of Modern Knowledge*.) Henry Holt & Co., New York. 256 pp., 50 cents.

This book is thoughtfully conceived and contains a somewhat unusual selection of material. It aims to indicate the functions of the nervous system with no more anatomical description than is absolutely required and with an appropriate emphasis upon matters of hygiene. The plan is carried out with considerable success. The author writes with a certain freshness of exposition and a ready employment of analogy which result happily in a presentation which is always clear and attractive. In the main the teachings concerning the ordering of life with a view to nerve conservation can be endorsed.

There is a dogmatic tone in some of the chapters to which objection may be made.

It is true that the lay reader and the elementary student desire just this air of finality. But it is not wise to make so many positive assertions with respect to questions which cannot be regarded as settled. The writer on popular science should improve his opportunity to teach suspension of judgment in default of evidence. This is a lesson not often learned. In the present instance it seems particularly undesirable to treat the nervous system as a conductor of hypothetical fluid instead of a transmitter of energy. The name "neurin" which already has a fixed chemical meaning should not be adopted for this new use.

Percy G. Stiles.

The Medical and Sanitary Inspection of Schools. By S. W. Newmayer, A. B., M. D., in charge of the Division of Child Hygiene, Bureau of Health, Philadelphia. 12mo, 318 pages, with 71 engravings, and 14 full page plates. Cloth, \$2.50, net. Lea & Febiger, Publishers. Philadelphia and New York, 1913.

In this volume, Dr. Newmayer has presented a book which should be read by every school physician, for there is hardly a question which is likely to confront him in his daily work to which he cannot find a solution.

This book consists of an introductory chapter, containing a sketch of the history of medical school inspection together with its object, and four parts, dealing with different branches of the work.

Part I takes up the administration, giving the details of managing a well-equipped division, including the duties of the school inspector, the school nurse, methods of inspection and record keeping.

The subjects are so treated that any city establishing a system of school inspection can find all the necessary details of the work, even to specimen forms of blanks, and the head of a division already established will find much of value in this part.

It is perhaps to be regretted the author does not lay more stress upon the advisability of

placing the control of school inspection in the hands of boards of health rather than in those of boards of education, for while it is freely admitted that the detection and exclusion of cases of communicable disease is a very small part of medical inspection, yet it is a part and at times a very important part, and it is one which the board of health must necessarily handle. If, therefore, the school inspectors are under the direction of the board of health, they are in a better position to cope with outbreaks of communicable disease, and are certainly no less competent to deal with other physical defects than inspectors appointed by a board of education.

Part II deals with the school buildings and grounds, a part of the work too often neglected or overlooked, but as the author truly says, "One cannot teach hygiene and healthful living surrounded by unsanitary buildings in which to conduct classes."

This part contains descriptions and plans of model school buildings and class-room equipment, all of which will be read with great

interest and profit by the school inspector. The section on ventilation and heating is worthy of careful reading.

The part ends with a short section upon cold rooms and open air schools, methods of improving the health of school children in which many cities are deficient, there being only fifty-five cities in the United States having such schools.

Part III treats of infectious, contagious and communicable diseases. It seems a pity that in dealing with this branch of his subject the author should fall a little below the level of the rest of the book, but certainly some of the methods of procedure advised are open to question.

In speaking of the various methods by which infection is transmitted, transmission through the air is included; surely the experience in various barrier hospitals has discredited this method of transmission.

The author directs that a class-room in which a case of scarlet fever, diphtheria or smallpox has been found should be closed and disinfected. One is tempted to wonder how much infection would be found in a room in which a child with one of these diseases had been present for a few hours, or how many health departments, when they do disinfection with formaldehyde, are careful that the amount of moisture in the air of the room is over sixty per cent. or that the temperature is over 65° F.

As it is stated that a failure to observe either of these precautions will cause the disinfection to be a failure, it would be more effective to have the patient's desk and the floor around it carefully scrubbed.

Again the period of exclusion of contacts seems to be unnecessarily long, in view of the fact that modern practice seems to tend toward lessening the quarantine restrictions upon the well members of the family and relying more upon careful isolation of the sick

and inspection of contacts, as a method of controlling disease in the schools.

Following these general methods of procedure come short descriptions of the various diseases giving the more marked signs to be looked for in each.

This part is illustrated with numerous illustrations, some of them colored, which add much to its value.

Part IV treats of the various non-communicable ailments and defects which legitimately come under the supervision of the school inspector with more or less detailed descriptions of the procedure to be followed in each.

Methods of testing sight and hearing are given together with warnings in regard to avoiding certain pitfalls, and much attention is given to dental defects and their treatment.

Then follows a consideration of orthopedic defects and certain systemic ailments as malnutrition, and anæmia. The question of school lunches is considered and the author very wisely discourages their establishment, if intended as a relief for improper nourishment of the poor, holding that this is no part of the school function.

It is to be regretted that the author does not go more into detail in the question of teaching sex hygiene. On the whole he approves of teaching it, especially in the higher grades, but warns against exciting curiosity in the younger children. To quote from the author "Knowledge of a subject does not take the place of moral stamina." In these days when so many ill advised but well meaning persons are clamoring to have the schools teach sex hygiene, with no thought of the fitness of those who may be called upon to give the instruction, it is well to remember that sentence.

The book is well printed, easy to handle and of a convenient size, its many cuts adding much to its value.

Francis George Curtis.

The Medical Inspection of Girls in Secondary Schools. By Catherine Chisholm, B.A., M.D., medical inspector to the Manchester High School for Girls. 208 pages with diagrams. \$1.10 net. Longmans, Green. New York. 1914.

Dr. C. Chisholm displays a clear conception of the educational function of school medical inspection. The social position of girls in secondary (high) schools is such that they

exert an important influence on the community in which they live. They are the teachers, the educators of the future, the social workers, the nurses and women doctors, the

wives of the professional, business and legislating classes of their generation.

The attitude of such women to the question of public and private hygiene is of very great importance to the community. It is important also that girls from these schools shall be turned into the world mentally and physically fit. The tendency of eager, ambitious students is, often by early over-pressure, to undermine health. Perhaps this is found especially in girls' schools. They have fewer opportunities for distraction than their brothers. The care of bodily development during the years when girls are discerning and testing their capacity, when they are subject to strain of growth and effort is of the highest importance.

She truly takes it for granted that in a girls' school the most suitable medical inspector will be a woman. Viewing the matter without prejudice, it is evident that girls will

find it easier to submit to medical examination if the examiner is a woman; and this opens a sphere of activity for women physicians all over the world.

The medical inspector, whose interest is in the school as well as the individual girls, must be one who can visit the class-rooms and discuss school problems with the teachers without reserve, and in a girls' school this is best accomplished by a woman physician. Her duties also include the supervision of remedial work in the gymnasium and the instruction of teachers, pupils, and parents in the hygiene of school life.

The book is complete in all essentials of instruction and advice, covers the general field of school medical inspection admirably, and readily takes its place among the best of recent works on this important subject.

W. W. Roach.

HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS.

Reading, Pennsylvania.

Considering the amount of money expended on health work, the city of Reading is fortunate in having such good sanitary conditions as are shown in the report of the Board of Health for the year 1912. Less than fourteen cents per capita is expended on health work each year and of this amount Dr. Becker, president of the board, says: "The greater proportion of our appropriation is used for paving and repaving of private alleys, and the cost of which is assessed on the abutting property owners, who pay it back into the treasury, and when paid promptly, we can again use it, but eventually it goes into the treasury at the end of the fiscal year."

It is, perhaps, a good plan for the Board of Health to act in advisory capacity on the paving of alleys but that it should be obliged to advance the cost out of an already inadequate allowance is ridiculous.

The effect of such false economy is shown by the fact that an assistant plumbing inspector, capable of handling the necessary work, cannot be hired for \$780, the salary offered. The chief plumbing inspector receives \$1,000 per year but the health

commissioner receives only \$880. Less than \$75 a month! Other necessities which cannot be obtained under the present arrangement are more roomy quarters for the office and laboratory, the employment of visiting nurses and child welfare nurses, a municipal hospital, public comfort stations and reorganization which will allow the health commissioner to carry on some work other than quarantine and fumigation which now occupies the greater part of his time.

The report on vital statistics shows a death-rate of 13.22. The birth-rate is reported as 24.05, but of the 2,393 births used in obtaining this figure, 192 were either premature or still. The infant mortality, based on the corrected number of births is 89 per thousand births. The alphabetical classification of deaths, so common in Pennsylvania, is open to the usual criticisms.

They report of the milk and meat inspector is one of the bright spots in the book and shows that much improvement has been brought about by active work especially along the line of education of the producers, and by following up with prosecutions when necessary.

Rochester, New York.

Dr. George W. Goler, health officer, submits a very good report of the work of the Health Bureau of the city of Rochester during the year 1912. Rochester has a population estimated at 225,000; a death-rate of 14.43 per thousand; birth-rate of 24.57 (probably incomplete among the foreign population); and an infant mortality rate of 75.6 per thousand births. All of these rates are good and are an improvement on the average of preceding years.

The report covers forty-eight pages and is largely statistical so that a great deal is covered for the amount of space used. The tables of statistics are unusually complete

and are in general well chosen. The present tendency of health reports, however, seems rather to be toward a form which will be easily read and attractive and instructive to the common citizen rather than a mere statistical résumé which is of interest only as a reference work. It is unfortunate that among tables which are in general so up-to-date the international classification of causes of death should be displaced by an alphabetical classification.

The expenditures of the Bureau of Health, not including garbage disposal or the maintenance of the municipal hospital, amount to about thirty-three cents per capita per

annum. The milk supply is reported as unsatisfactory but improving. A Lorenz Milk Tester is being used and has been of great value in demonstrating to producers, as well as consumers, the amount of dirt present in the samples from various sources. The water supply of the city is of good sanitary quality but has given trouble during

the year on account of various algae and protozoa. One of the most interesting sections of the report is that on the child welfare work which is being carried on. Medical inspection of schools, school nursing, and chemical and bacteriological laboratories are maintained but are only reported statistically.

Springfield, Illinois.

It is refreshing to be able to review a health department report for 1913 thus early in the year. The report of the Department of Health of Springfield, Ill., was received early in February, less than a month after the receipt of many 1912 reports. Aside from its promptness the Springfield report has not much of which it can boast. A few cities as large as Springfield (estimated population, 56,476) publish no health department report, but a seven page report from the capital city of Illinois is not a very creditable showing.

The department, however, is aware of its own deficiencies and does not hesitate to point them out and make recommendations for their remedy. When a city buys only seventeen cents' worth of health per capita it cannot complain about the small quantity it gets. Nor are conditions as bad as might be expected. The death-rate for 1913 is 17.6 per thousand, and this is the highest in six years. The death-rates from tuber-

culosis, diphtheria and typhoid show a decrease from the 1912 figure. The death-rate of children under one year per 1,000 births appears to be 127 but it is estimated that if all births were reported the rate would be reduced to 84.

Among the improvements recommended for the coming year are an ordinance which will enforce connection of new buildings with water and sewer where possible; the establishment of a certified milk commission, the establishment of infant milk depots, and the introduction of medical examination of school children.

The report is a good one but should be more extensive. The tables of statistics are well chosen but incomplete. Although money may be more immediately effective when expended for actual sanitary work; it is possible that a more complete (and expensive) report might lead to a larger appropriation and thus prove to be a good investment.

DEPARTMENT NOTES

The Health Officer and Leadership.

"Leadership is the best asset of a health officer, teacher, governor or statesman. When General Grant took command of the armies of the Union, the Washington board of strategy went out of business. To be a leader in sanitation is just as important in its line, as to be a Grant; in fact, all successful health officers possess the Grant faculty of leadership. Our health officers need to have faith in their powers. Not to have faith in their powers hobbles them. The man who inhibits his natural powers is

dominated by negative ideas. The mind grows by what it feeds upon. If it feeds upon fear and failure it will reap them. The thing to do is to go ahead and try. One learns by failure as well as by success. The health officer who tries and fails is worth a thousand never-tries and in nine cases out of ten wins. The successful sanitary leader is he who is not turned aside by fear of failure or a few real failures, and soon numbers his followers by a majority of his community."

Public Health (Michigan State Board of Health), December, 1913.

Quarantine for Measles.

It is often claimed that there is no virtue in quarantining cases of measles since the contagious stage has existed and may have passed before diagnosis can be made. In the *Medical Officer* of January 3 an argument is put forward that the indirect effect of quarantine may be sufficiently valuable to make it worth while.

"While pointing out that the compulsory notification of measles with a view to preventing the spread of the disease is generally held to be of doubtful value, Dr. J. C. Bridge has advised the Breconshire county council that if such compulsory notification merely impressed upon the parents the highly infectious nature of this disease and the danger of it to young children, the expense incurred would be fully justified. He writes:

"The exclusion of children from school and the closure of schools is the only means at the present time of preventing the spread of the disease, but to what extent such measures operate for good it is difficult to see. Undoubtedly contacts and children suffering from measles are allowed to attend Sunday schools and places of amusement without let or hindrance, and for this reason I would strongly advocate making the disease notifiable." Dr. Bridge adds that where children are exposed by their parents while in an infectious condition, he would also strongly recommend prosecution."

Public Baths in Los Angeles.

The following clipping from the *Monthly Bulletin* of the Los Angeles Health Society (December, 1913) shows how the latest ideas in public health work are being taken up in the West before the bad conditions which now exist in some of the eastern metropolises have reached them also.

"Liverpool was the first city to establish municipal bath houses. Her example was quickly followed by other English cities, and all but seven with a population of more than 50,000 inhabitants have a system of bath houses and many of the smaller cities possess public baths.

"European cities are far in advance of American cities in the provision of bathing

facilities. Germany and Japan have most wisely provided for municipal bath houses.

"In 1895 the state of New York passed a law providing that all cities having 50,000 population or more shall establish and maintain free public baths. Buffalo erected two absolutely free bath houses and during the calendar years 1897-1900 a total of 323,942 baths were taken.

"There is a crying need for free baths in Los Angeles. We have a population of 500,000 people and a large percentage of our population have no bathing facilities. The percentage of transients is as great or greater than any other city of its size, and there are no places where a poor man can get a free bath or where, if able to pay a small sum for soap, towel, etc., they may take a warm bath. The benefits to the public cannot be over-estimated when we consider that clean bodies and surroundings insure health, earning capacity and better morals.

"We know the demand on the city for many public utilities has barred the establishment of comfort stations and public baths, but we do not want to defer this necessity in our excited rush for wealth until nature calls a halt to our progress."

Anti-Smallpox Measures in Toledo.

The *Weekly Report* of the Cincinnati Board of Health, for the week ending January 17, tells of the epidemic of smallpox in Toledo and of the steps which have been taken against it as follows:

"With over two hundred cases of smallpox reported in Toledo since December first, with drastic action threatened by neighboring cities, the State Board of Health and the Federal Government, that city at last placed in operation the machinery supplied by the state law for the suppression of epidemics.

"The following orders of the Toledo Board of Health became effective January 19:

"No person shall be allowed to attend any institution of learning in the city of Toledo without first presenting a certificate of vaccination from a duly registered physician, which certificate shall state that said person has been successfully vaccinated within the preceding five years.

"All employees of labor shall be notified that the Board of Health expects them to have all employees vaccinated, and notice is hereby given that in case of smallpox developing in any place of employment the Board of Health will put such place under quarantine."

"The official statement of the Health Board regarding the small pox situation in Toledo follows:

"Of the more than two hundred cases discovered since December first, none of the patients had been vaccinated within five years. But one had ever been vaccinated and that had been done thirty years previously."

"This is a remarkable bit of evidence as to the protective value of vaccination."

A Home-Made Test.

"Housewives who note a dirt sediment in the milk delivered to them in bottles can apply this test to the milk and present the pledget of cotton to their milkman as proof positive of a dirty, unsafe delivery. A simple method of applying this test to the milk is to use a perfectly clean funnel, inside of which a small piece of clean wire netting has been fitted at the neck opening, placing on this wire screen a thin layer of clean cotton. Stand the funnel in a large Mason jar and filter the milk through the cotton. Remove the pledget carefully and place on a clean white card to dry.

"If there is evidence of dirt on the cotton call attention of the milkman to it. If there is no improvement in subsequent deliveries, notify the Health Department."

Bulletin of the Chicago School of Sanitary Instruction, February 7, 1914.

The Telephone Transmitter and Disease.

The State Hygienic Laboratory of California has recently conducted some experiments with a view to determining the possibility of disease transmission by the mouthpiece of the telephone. In the *State Board Health Bulletin* for October the following results are given:

"Summary.

"People in using a telephone may infect the inner surface of the transmitter with

particles of saliva, but the three mouthpieces tested showed a majority of organisms growing better at room temperature than at body temperature.

"Public telephone mouthpieces are often wet with condensed moisture from the breath, and then the only possibility of the transmission of disease is by direct contact. When the mouthpiece is dry the infectious dirt does not appear to become free dust and it is practically impossible for germs on transmitters to be blown back on to the mouth during a telephone call.

"Mouthpieces in busy call offices soon become gummy and unsanitary in appearance unless regularly cleaned, and, therefore, public telephone mouthpieces should be wiped off daily with a clean damp cloth.

"Diphtheria bacilli were not found on the ten public telephone mouthpieces examined, and the work of Bissell, Klein, and Spitta shows that it is practically impossible to contract diphtheria or tuberculosis from public telephone mouthpieces.

"Even in occasional cases of direct contact the public telephone mouthpiece cannot be compared to the public drinking cup.

"Conclusions.

"1. The danger of infection from public telephones is probably over-estimated.

"2. Mouthpieces in frequent use become unsightly if not cleaned at short intervals.

"3. From our own observations and the previous work of others we have formulated the following observations regarding 'sanitary' devices for attachment to telephone transmitters: 'Antiseptic' transmitters of the type investigated in the State Hygienic Laboratory in 1909 are entirely without value. Mechanical devices which protect and conceal the mouthpiece with fresh paper may have considerable value from the æsthetic standpoint and may possibly prevent a few infections from contact between the lips and the transmitter."

Public Laundries in America.

In an excellently written article in the December number of the *American City Dr. D. B. Armstrong*, superintendent of

the Bureau of Public Health and Hygiene of the New York Association for Improving the Condition of the Poor, tells of the need of public laundries in the large cities of the United States, and especially in New York. Doctor Armstrong introduces his subject as follows:

"'Public Health is purchasable'; so, indeed, is public cleanliness. As a matter of fact, it is obvious that, when we begin to spend money for public health, we can have no certainty of obtaining it unless we have entered the market for cleanliness. In general, cleanliness is a prerequisite for health. If the state or the community recognizes a responsibility in the form of maintaining health, it is quite logical, then, for it to recognize the obligation which lies upon it to make provision for public decency. Many communities provide the means for the cleansing of human bodies. It is just as essential to health and *decency* that public facilities, where private ones are lacking, should be provided for the cleansing of the garments, the condition of which must, otherwise, lower the tone of decency of the people in the community. I emphasize *decency*, for it is essential that health workers should realize more and more that it is impossible to justify most of our expenditures if we consider these expenditures to be inductive of health *alone*. It is very difficult to definitely ascribe ill-health to dirty streets, unsightly back yards, and such undesirable elements in our physical environment for the elimination of which we spend thousands yearly, not in reality to maintain public health, but, as a matter of fact, to establish public decency."

The article continues to discuss the history of the public wash house or laundry in this country and abroad where it was first tried and to tell of the organization, and methods of operation. Baltimore has the best public wash houses in this country and now operates five which have met with success and appreciation. There and in Philadelphia special days are set aside for men. The plan is supposed to improve housing conditions and cleanliness and consequently health, but in addition Doctor Armstrong says:

"The public wash house, like the public

bath, finds its chief justification in the fact that it gives to the people an opportunity to learn how to be clean and makes it possible for them to appreciate the value to health and decency in being physically clean. Physical cleanliness enhances their moral and spiritual tone. They will recognize more acutely their housing defects and will demand even more energetically than at present that equipment for the home which they have learned to use and value outside and the importance of which, for the preservation of health and the maintenance of decency, they have been educated to appreciate."

Diphtheria Carriers.

The *Journal of the American Medical Association*, in the issue of November 15, briefly abstracts an article from *Pediatrics* (St. Petersburg) as follows:

"Lunin found that in 708 cases of diphtheria only 1.1 per cent. gave rise to 'return cases.' The patients were discharged after three bacteriologic examinations of the mucus from the throat and nose had given negative results. He also found that the bacilli that occur in healthy people, or remain unusually long in those who have had an attack of diphtheria, are not virulent, and are thus harmless. They may accordingly be sent home or left among other patients; the only precaution he recommends is to gargle the throat and clean the teeth."

Buying Health in Chicago.

The following clipping from the *Engineering Record* tells of the cost of Chicago's health activities of December 20, 1913:

"That the preventable deaths in Chicago are equal to the *Titanic* death list every month is an appalling fact at which few appear appalled, according to Dr. George B. Young, the health commissioner, who makes an appeal to citizens to help the department obtain funds with which to reduce the increasing number of such deaths. That public health is purchasable—within certain limitations—and that a community can determine its own death-rate have been demonstrated thoroughly, not only at Panama,

but in large cities. Chicago has fallen behind in healthfulness and, Doctor Young states, is paying the price in losing the commercial advantage of being the healthiest large city in the world. The doctor is right in urging Chicago's budget makers to wake up and take steps to regain its lost prestige—a prestige which he declares counts far more heavily in a commercial sense than many thinking men realize. The department is asking for 16 cents per capita more than last year, bringing the rate up to 47 cents per inhabitant. Based on the last Census Bureau reports, if Chicago invested in health to the same extent that Boston, New York, Newark and Washington did, its appropriations would be \$1,460,000, \$1,340,000, \$1,316,000 and \$1,005,000 respectively, whereas it spent last year only \$723,000. In 1913 the health department cost Chicago 30.8 cents per capita; police, \$2.86, and fire fighting, \$1.43. The disparity is too great. The statistics indicate that the general awakening ten years ago to the increasing usefulness and possibilities of a properly equipped and financed health department in Chicago has not persisted. Ten of the largest cities in this country spend from 12.5 to 153.1 per cent. more than Chicago does. May Doctor Young succeed in persuading the finance committee of the city council that the department's past allowances, when compared to other cities where preventable death-rates are decreasing, have been too low."

Typhoid Epidemic in Washington.

"Eleven deaths and 297 cases of typhoid in Centralia, Wash., as the new year began, indicated the seriousness of what Dr. Calvin S. White, secretary of the Oregon State Board of Health, termed the worst epidemic of the fever that ever infested the Pacific Northwest. Doctor White was instructed to visit the site because of similar insanitary conditions in Oregon.

"According to Doctor White's published statement, all except six of the fever victims got their water from a shallow well on the edge of the Skookumchuck River, which constitutes the city supply. There was manifest contamination from the Mendoto

coal mines and the city of Tono and from many cesspools just above Centralia. Chelalis, only four miles away, is in danger, as its supply is nearly as bad.

"Hypochlorite of lime is being used as a temporary water sterilizer. Nearly 400,000 people have been vaccinated by the state authorities."

Engineering Record, January 10.

County Health Officers.

The movement for full-time county health officers is getting a foothold in the South more rapidly than in the North and West. The State Board of Health of North Carolina is trying hard to get every county in the state into line and the idea is spreading to other states. The following from an editorial in the *Southern Medical Journal*, journal of the Southern Medical Association:

"Alabama is to be congratulated on having a county whose board of supervisors is wide-awake and up-to-date, and willing to listen to the advice of its physicians. The Walker County Board has appropriated \$2,500 a year to pay the salary of their county health officer, and \$500 for his traveling expenses. He is expected to devote all of his time and effort to the duties of his position, and if he performs those duties in an active and intelligent manner he will find little opportunity for anything else. It will be a fortunate day for Alabama when every county within her boundaries shall have realized that human life and human health are her most precious possessions, and that no other money spent by its public officials is more wisely expended than that which guards and preserves them. Every jail, courthouse, schoolhouse, show-room, bakery, grocery, butcher shop, ayé, even the churches, at times need the supervision of such an officer. His authority will be magnified an hundredfold in the estimation of people generally when they learn that his services are valuable and actually worth paying for. Every county in every southern state needs an alltime health officer as a business proposition, partly because, like similar communities in all the United States, it needs their services, and also because an erroneous impression prevails in some other

parts of the country that we have more sources of disease than they; and a vigorous, active health officer reassures them of protection against all possible sources of disease. We want them to come and establish their homes and their pursuits side by side with our own, and the assurances of competent supervision of all matters pertaining to the public health is a strong argument in our favor. Walker County, though one of the richest in soils, timber and minerals in Alabama, has not generally been as highly appreciated for public enterprise as it has deserved, but this step has at one bound established it as a leader in the forward march of development. What other county will be first to follow?"

Improving Rural Health.

In the present rapid spread of the public health movement the dwellers in the country or in small towns and cities are too often forgotten. The increased number of full-time county health officers is a step in the right direction but a very short one. The coöperative board of health system which is proving so successful at Wellesley, Mass., and the surrounding towns could not be applied in the more thinly settled districts of the West. The *State Charities Aid Association News* (N. Y.) of January contains an article on the views of Doctor Biggs, the new state health commissioner, on this subject. We quote as follows:

"Dr. Biggs pointed out that in the country each dwelling house is a unit, just as the city is a unit. Each dweller in the country must provide for himself, water supply and sewage disposal, which the city provides for its residents. Through their health departments residents of the city are afforded health protection in both these particulars, among others, by the application of the results of scientific investigation. Such protection is not now given to rural dwellers, but the farmer has as much right as the city resident to the best health protection that modern science affords.

"By extending to the country, through a division of rural hygiene, the health advantages so long enjoyed by the cities, Doctor Biggs believes that the death-rate and the

sickness rate in the country can be very much decreased and the efficiency of the community proportionately improved.

"In discussing the need for a division of rural hygiene in the State Department of Health, Doctor Biggs said:

"Up to this time the rural districts, not only in this state but through the country, have received scarcely any attention from sanitary authorities. As a result we find that sanitary conditions there are scarcely different from those which existed in comparatively early times.

"The great cities, notwithstanding their density of population and large percentage of foreigners ignorant of our laws and language, have entirely outstripped the country districts. Not only is the death-rate in the country relatively higher than that in the cities, but the birth-rate is lower.

"New York City's death-rate is materially lower than that of the rural districts of the state. Through a long series of years the death-rate of the metropolis has been slowly but steadily declining until last year, it was 137 out of each thousand of the population. On the contrary, in the rural districts, not only has the death-rate not declined but it has slowly increased."

Publicity in Prosecutions.

Believing that full publicity in connection with criminal prosecutions for violation of the Sanitary Code is one of the best means to secure compliance with its regulations the Department of Health of New York City will, in the future, publish in its weekly bulletin a summary of the cases decided during the week. The statement will be divided into two parts; one showing the prosecutions in the Court of Special Sessions and giving names, addresses, character of violation and sentence; the other merely showing the totals of the cases tried in the Magistrates' Courts without giving details since such cases are only of minor violations.

Feline Diphtheria.

The *Journal of the Royal Sanitary Institute* in its February issue abstracts a portion of the discussion of a paper on the relation of

human and animal diseases. The following note on diphtheria in cats is suggestive, if not altogether conclusive. Shall our "rogues gallery" include "diphtheria Tommy" as well as "typhoid Mary?"

"Dr. Frank Webb (Leigh, Lancs.) said that on June 9th a case of diphtheria was notified (a girl aged nine years), and on investigation at the child's home the mother said, 'I think she has got it (diphtheria) from the cat. The cat has been bad a week; it cannot meow, and it has a funny sort of cough.' He suggested that the cat should be destroyed. That was done, but previously a couple of swabs were taken from the cat's throat. Swabs were also taken from the child's throat. Cultures from both were made on Loeffler's blood serum, and microscopic examination showed, in the case of the child and also the cat, a mixture of staphylococci and Kleb's Loeffler bacilli.

"Further investigation showed that a neighbor's cat had died ten days previously suffering with the same symptoms, 'unable to meow and a cough, unable to take food and wasting.' Later, five other cats in that street were found to be ailing and were destroyed.

"The child had been in the habit of taking the cat to bed with her regularly, and it always slept on the child's bed; it was likely that it also slept in the bed with the child."

Examinations for Hookworm Ova.

Public Health Reports of February 20 gives the following directions for the technique to be used for the examination of fresh specimens of suspected feces and for making permanent mounts. The directions are prepared by Dr. M. J. White of the United States Public Health Service.

"1. Agitate about 0.5 gram of feces with 5 or 6 cubic centimeters of water in a small test tube. The centrifuge tube is suitable.

"2. Strain through two layers of gauze to remove the too consistent particles of feces, and wash the residue with a sufficient quantity of water so that the total filtrate will properly fill a centrifuge tube.

"3. To the tube of filtrate add and diffuse therein 5 drops of a 1 per cent. solution of

'Toluidinblau' in a 2 per cent. aqueous solution of carbolic acid.

"4. Centrifugate sufficiently, two minutes.

"5. Decant all supernatant fluid.

"6. Place two oeses of the sediment on a slide and spread by gentle pressure with a cover glass.

"7. Magnify 105 times in a subdued light (oc. 4, ob. 3 Leitz).

The dye imparts blue and purple tints to the fecal material and a light-brown tint to the eggshells. This polychromatic effect greatly facilitates the locating of the eggs, which are then magnified 370 and 1,000 times for the purpose of more definite identification of the blastomeres (oc. 1, ob. 7, and oc. 4, ob. 1-12 oil Leitz).

"These stained specimens may be satisfactorily mounted by rimming with melted paraffin. In such mounts the complete development of the egg, including the first embryonic stage, may be watched. As the egg becomes mature and the shell disintegrates, the embryo, whether dead or alive, takes on a purple color, as the result of coming in contact with the small quantity of unattached stain present in the mount. As long as the egg shell remains intact its color is light brown, but as soon as it permits the unattached dye to come in contact with the contained embryo the color of the egg changes, so that instead of a light-brown egg there is a purple egg.

"In some instances the embryos entirely escape from their egg shells and lie free in the field, but dead, having taken a beautiful purple color. In others they remain coiled up dead in the egg shells. This change increases the value of permanent mounts, as some of the eggs may remain brown, while others show the embryos stained purple. It is necessary to avoid pressure on these mounts, as the embryos are very fragile, and the movement of the surrounding air bubbles is likely to cause fracture and displacement."

Relative Efficiency of Rat Traps.

Anti-rat campaigns are becoming so general that the United States Public Health Service gives space in the February 6 issue of *Public Health Reports* to a report on the relative efficiency of various rat-catching devices as

tested by Surgeon V. G. Heiser in Manila. The report follows:

"With a view to ascertaining which type of rat trap was most effective and also the average number of rats that are caught by a given number of poisoned baits that are set out, statistics were kept during the anti-rat campaign in Manila. The ratio maintained in catching rats with two types of traps is indicated in the following table, a perusal of which will show that for the three months ended June 30, 1913, there were 120,565 spring or snap traps set and that for every 100 of this type of trap set there were caught 6.9 rats. During the same period there were 47,075 wire cage traps set; the total number of rats caught was 339; which gives 0.72 rats caught for each hundred traps set. For the quarter ended September 30, 130,627 spring or snap traps were set and 9,753 rats were caught, which gives 7.47 for each 100 traps set. During this period 40,621 wire cage traps were set and 395 rats were caught, which gives 0.97 rats caught for each 100 wire cage traps set.

"No accurate record was kept of the number of each kind of rat bait set. Only the total of all was recorded. Bacon, or cocoanut with strychnine and rice with arsenic were used. For instance, for the quarter ended June 30, 1913, there were 166,237 poison baits set in new territory and the rats found poisoned averaged for each 100 baits 0.72. During the next quarter there were 177,309 baits set in territory that had been worked over, and only 216 rats, or 0.12 rat per 100 baits were killed. From the foregoing it appears that the rat poison ranks lowest in efficiency but perhaps highest in economy. In view of the fact that the original cost of the cage trap is many times more than that of the spring trap, and the cost of maintenance is very high, it will be apparent that the spring trap is by far the more economical as well as more effective of the two."

Teeth and Public Health.

In previous issues of the JOURNAL attention has been called to the importance of oral hygiene as an essential to health and to the recent movement which is taking place toward the addition of dental inspection to

medical inspection of schools and toward the establishment of free dental clinics for the benefit of those too poor to purchase health for themselves. It is now generally believed that defective teeth may produce sickness by lowering the vital resistance through the toxemia produced by the swallowing or direct absorption of pus formed within the tooth. In addition thorough mastication may be prevented so that inanition and indigestion may result and perhaps the least important is the fact that the cavities in the teeth may act as incubators for tuberculosis, scarlet fever, or other infections. Even this last has seemed so important to the Straus Tuberculosis Preventorium at Farmingdale, N. Y., that no child is allowed to enter whose teeth have not first been put in perfect condition and one sanitarian has expressed the opinion that cavities in the teeth of a patient should be filled before he can be released from quarantine when the case is a contagious disease of the respiratory tract or its adnexa.

In New York City it has been estimated that among 700,000 school children 650,000 have teeth which are in need of attention. On learning of these figures some years ago Judge Peter T. Barlow was so impressed that he enlisted the aid of some friends and established an experimental free dental clinic. This has been a great success, having treated over 20,000 cases already at a cost of less than \$5,000 a year. Most of the children treated come from families with an income of about \$15 per week, so it is evident that city supervision is necessary since the parents are unable to bear the whole of the usual cost of treatment.

W. H. Allen of the Bureau of Municipal Research estimates that New York needs about 600 clinics to cover the ground thoroughly and it is hoped that a similar movement may be undertaken in other cities.

The December number of the *Rochester* (N. Y.) *Health Report* contains some helpful suggestions on the preservation of teeth and digestion which are among the first requisites for good health. We quote the article entire:

"The necessity for the use of the tooth brush is being felt close to border line of poverty. Even the stupid are coming to realize that a clean mouth is a kind of esthetic

asset. And, too, visits to the dentist are undertaken for the purpose of filling teeth. It is a remarkable sign of the times when we have within a decade witnessed the removal of most of the dentists' signs which proclaimed that teeth were extracted without pain.

"Owing to the educational campaign that has been waged by the dental branch of medicine and by the social service workers, the necessity for preserving children's teeth has been brought home to most of the intelligent parents, to a great many poor parents and to even some of the stupid ones. The use of the tooth brush after meals is becoming more common, and dental floss or even the rubber band for removing particles of food between the teeth is coming into something more than occasional use.

"One of the great difficulties, however, in the way of preserving teeth, especially the teeth of our children, is the fact that we continue to feed them on "spoon victuals" instead of on food that will provide work for their teeth. We furnish our dogs with dog biscuit and then we feed our children on the inside of baker's bread and tender or hashed meats, forgetting that one of the facts the archeologist has taught us is that man in the archaic period had practically no defects of his teeth. He lived on coarse food; his flour was ground with the husks on it; his bread was frequently so dry that it had to be chewed in order to be swallowed, and much of his other food was either coarse meat or contained hard vegetable fibre. If we feed children on hard bread or biscuits that they will have to chew, we will not have to provide so much stuffing for the teeth. And, too, what is good for children is good for many adults. Someone has said that we are a civilized and constipated people; and if we cannot immediately take to bread as hard as dog biscuit for the purpose of preserving the teeth, let us, at least, take to bran bread for the relief of the sin of constipation. The following is an excellent formula for a bran flour mixture and a recipe for bran bread. The recipe may be varied by the addition of nuts or raisins; it may be baked hard and allowed to dry; but it is good for the teeth and not bad for the bowels.

Bran Flour Mixture

Bran	5 parts
Graham Flour	3 parts
White Flour	1 part

"To Make Bran Bread.—Mix one teaspoonful of baking powder with one-half cup of white flour and sift thoroughly; then take three and three fourths cups of the bran flour mixture, one pint of sweet or sour milk, three-fourths cup of molasses, one even teaspoonful of baking soda dissolved in one fourth of a cup of boiling water. Mix and bake one hour in a slow oven. This quantity will make two small loaves of bread."

Legal Control of Milk Supply.

From the *American City* of February we clip the following report of a decision on the legal control of a milk supply:

"That a city ordinance designed to protect the public against the sale of impure food, including milk, is a valid exercise of the state's police power, was decided by the United States Supreme Court in the case of *Adams v. City of Milwaukee*, 33 Supreme Court Reporter 610. It was further held in this case that such an ordinance may validly authorize summary destruction of impure milk kept for sale. The Milwaukee ordinance, involved in this suit and upheld by the Supreme Court, provides that no milk drawn from cows outside of the city shall be brought into the city, contained in cans, bottles or packages, unless they be marked with a legible stamp, tag or impression, bearing the name and address of the owner of the cows, and unless such owner shall, within one year from the passage of the ordinance, file in the office of the commissioner of health a certificate of a duly licensed veterinary surgeon or other person giving authority by the State Livestock Sanitary Board to make tuberculin tests, stating that such cows have been found free from tuberculosis or other contagious diseases. The certificate is required to give a number which has been permanently attached to each cow and a description sufficient for identification. The certificate must be renewed annually and must show that the cows are free from tuberculosis or other contagious diseases. Another clause of the ordinance

provides that all milk not conforming to the requirements of the ordinance shall, upon discovery thereof, be confiscated and immediately destroyed. These regulations were, also, attacked in the Supreme Court on the ground that there was an unconstitutional discrimination against milk produced outside the city in favor of milk drawn from

cows within the city, but the court held that the mere fact that a somewhat different kind of inspection is provided for the latter class of milk does not invalidate the ordinance, sale of all milk, whether produced inside or outside the city limits, from sick or diseased cows being prohibited under the same penalty."

PERSONAL NOTES

The following were elected to membership in the American Public Health Association, March 12, 1914:

Dr. William Green Abernathy, Woodland, Miss.

Mr. H. N. Campbell, Boston, Mass.

Mr. N. J. R. Chandler, Plainfield, N. J.

Dr. David Lawrence Flanary, Dyersburg, Tenn.

Dr. Davis Furman, Greenville, S. C.

Mr. Curtis E. Lakeman, Glen Ridge, N. J.

Dr. Edward Charles Podvin, New York City.

Dr. Clarence E. Smith, Greenville, S. C.

Dr. Linsly Rudd Williams, New York City.

Dr. John Gibbon Wolf, Pueblo, Col.

Dr. Harry F. Watt, Ocala, Fla.

"After a service of almost twenty years in the Department of Health and twice commissioner of health, Doctor Lederle resigned as commissioner of health on February 1, 1914. In recognition of his splendid service to the Department of Health and to the cause of public health generally, the Board of Health at its last meeting, adopted the following resolution:

"Resolved, That the Board of Health of

the City of New York at the close of the long career of high public service of Dr. Ernst J. Lederle, commissioner of health of the city of New York, hereby spreads upon its minutes this mark of its appreciation of the splendid vigor, profound and enlightened intelligence and lofty spirit of devotion which have characterized his fulfilment of his trust. During his administration of the department, the causes of preventable disease have been sought out, studied, and, as far as possible, eliminated with a gratifying resultant improvement of general health of our people and reduction in the death rate. The multifarious activities of the department have been systematized and brought to a high state of efficiency. For these things, this board, of which he has been a member for so long, desires to express the esteem his character and service have called forth, and of them, to make public record of this official recognition."

Weekly Bulletin New York City Department of Health. February 7, 1914.

Dr. Linsly R. Williams has been appointed Deputy Commissioner of Health for the State of New York.

PUBLIC HEALTH NOTES.

Water Purification in 1913.

From the *Engineering Record* of January 3, we clip the following summary of the progress in water purification during the past year as seen by Mr. Allen Hazen:

"The progress of water purification during the year has been considerable. Two great cities have adopted filtration and are now installing plants. One of these—St. Louis—adopted ten years ago a partial method of water purification, which marked a great improvement on previously existing conditions. Perhaps the example of other cities with more complete plants, maintaining supplies of superior quality, has served to bring about dissatisfaction with the partial purification and has led to the adoption of the more complete treatment.

"Cleveland, after persistent efforts, extending through many years, to secure pure water by driving tunnels farther out under the lake and by carrying sewage to distant points of discharge, has wisely reached the conclusion that the filtration of the water is both a more certain and more economical method of reaching the desired result.

"The defeat of a project for filtering Croton water supplied in New York City is to be recorded. The plans had been carefully prepared by competent engineers, the work had been authorized and bids received, when pressure was brought to prevent the award of a contract to any bidder. It must be considered that this important work is only temporarily postponed, for New York City will not much longer consent to be supplied with water inferior in quality to that of neighboring cities.

"With filter works for Baltimore in progress, the circle is rapidly closing, and the time is not far distant when every large American city will supply to its people water of excellent quality, the quality being secured either by means of artificial purification or by other adequate safeguards.

"The year has been an important one in the development of the art of disinfection. It has become more and more clear that the

proper field for this process is an auxiliary to filtration. The use of hypochlorite of lime, which became common a few years ago, has been gradually and greatly extended, and the advantages of its use have become so apparent that disinfection either in its present or some equivalent form will always be insisted upon. On the other hand, continued experience has shown the difficulty, or perhaps sometimes the impossibility, of disinfecting waters adequately with hypochlorite of lime without at the same time producing disagreeable tastes and odors. The use of liquid chlorine as a substitute is being extended, while ozone and the ultra-violet-ray methods are receiving increased attention as offering promise of being able, with improved apparatus, to furnish the desired disinfection without the production of disagreeable tastes and odors."

A Notable Step Forward.

Summing up the record of 1914 public health in Great Britain, the January issue of the *Journal of State Medicine* heads the list with the following comment:

"The most noteworthy subject of the year's work has undoubtedly been that of 'Venereal Disease,' and the ventilation of the subject is so noteworthy, not simply because of its immense importance, but because hitherto it has been relegated for discussion to scientific journals alone. *The Times* has once again proved its value to the community by a fearless exposition of facts and figures, and by calling the scourge by its proper title and not referring to it somewhat vaguely as 'the social evil,' or some other such term.

"At the conclusion of its meeting in the summer, the International Medical Congress passed two resolutions, one of which drew direct attention to the ravages of syphilis, and called upon the governments of all countries there represented adequately to deal with the question of its prevention. Almost simultaneously our own government announced the appointment of a Royal Commission; and, a few weeks later, there was

issued by the Local Government Board a most instructive and comprehensive report on 'Venereal Diseases.' There cannot be given too wide a publicity to all the facts, and now that a definite start has been made in instituting systematic inquiry it is the duty of all medical men, and, indeed, of the whole community, to see that such inquiry is prosecuted to its conclusion, and that the preventive measures to be proposed are put in force without delay."

A New Tuberculosis "Cure."

Coming so soon after the general discrediting of the Friedmann cure for tuberculosis we must, at least, compliment the optimism of the man who hopes to make a success by following in Friedmann's steps. This man is Dr. Hans Karfunkel of Berlin who, some time ago, applied to the Board of Health of New York City for permission to treat cases of tuberculosis with a culture of living bacteria. A culture of the bacteria was submitted to the board with directions for treatment and a history of the source of the culture. Investigation showed that the culture was of the hay bacillus type and could hardly have been derived as claimed and the doctor's application was denied.

Leprosy in France.

Notwithstanding the fact that the greater part of our contagious diseases are more fatal and more easily spread than leprosy, this disease invariably inspires a peculiar panic in the minds of the public. This may be a blessing, since we have faith in the dictum of Pasteur one of our first steps in banishing contagious disease from the face of the earth should be to prevent its gaining a foothold in new soil. The February number of the *Journal of State Medicine* speaks of conditions now existing in France as follows:

"Some alarm has been caused by the increase of leprosy in France, and particularly in Paris, and Dr. Marchoux, of the Pasteur Institute, is to report upon measures best fitted to prevent any further spread of the disease.

"Leprosy is a contagious malady, but exactly how it is communicated remains a

mystery. No less than 5 per cent. of the sewer rats of Paris are leprosy, and the number of lepers in Paris has increased in a few years from 50 to 300. In the provinces the chief centers of the disease are near Guingamp, in Brittany, where there are about forty lepers, and on the Italian frontier, where there is a colony of sixty. A few cases are also to be found at Marseilles.

"The conditions under which the disease spreads have changed but little in the provinces since the Middle Ages, and in Dr. Marchoux's opinion there is no great reason why the disease should not again become the scourge it was six or seven hundred years ago. Up to the present French legislation has in no way checked the disease, which is not even notifiable. This state of affairs is to be remedied, and Parliament will be asked to adopt a bill rendering obligatory the notification of leprosy and enforcing the rigorous isolation of lepers, either in their own homes or in special leper houses. A medical committee will be empowered to order the removal of any lepers from their homes to leper houses if they are not effectively isolated."

Fighting Bad Housing in Paris.

Perhaps the most expensive measure ever taken to improve housing conditions is that noted below, as clipped from the *Journal of State Medicine*, February, 1914:

"In the course of the next eighteen months cheap and hygienic dwellings are going to be erected in Paris (a city of high rents) for no fewer than 60,000 persons who are at present living in insanitary houses. The municipality of Paris has borrowed £890,000 from the National Pensions Office at 4.2 per cent., and has already purchased 36 acres of building land for £433,222, an average cost of 5s. 6d. per square foot. At a cost of £2,600,000, it will be possible to build 11,000 lodgings, each capable of accommodating at least five persons. These dwellings will, it is hoped, be ready for occupation in June, 1915.

"This action on the part of the municipality gives effect to a bill dealing with the housing problem passed by Parliament last year, which empowered the Paris municipality to incur direct expenditure of £6,000,000

in improving housing conditions and authorized it to make advances to the philanthropic and building societies which are trying to solve the housing problem. The council has decided to spend the remaining half of this authorized expenditure in the construction of dwellings on the site of the dismantled fortifications of Paris when the grand scheme which will give Paris yet another ring of boulevards becomes a reality.

Co-operation for Rural Sanitation.

From the *Pacific Pharmacist*, January, 1914, comes the following timely note on sanitation in rural districts. While the remarks are especially aimed at California, the awakening of the conscience of those druggists who sell the most worthless and even dangerous patent medicines without hesitation would be a fine idea anywhere.

"We feel that a subject of the greatest importance and one which is almost totally neglected by the State University, is a campaign to improve the sanitation of the rural home. Those who pay the taxes which maintain the university have a right to expect some return benefit. There should be a complete campaign directed against the dissemination of disease in the rural districts. Sanitary home building, care of the body, methods to prevent the spreading of communicable diseases, water supply, sewage disposal, care of the sick, pure foods, pure and wholesome drugs, etc., should be explained and taught in the home or in the community. This propaganda work could be carried out by means of lecture courses and by means of circulars. The influence of the medical quacks which reap such a rich gain from the rural districts should be counteracted. It seems to us that in this particular work the assistance of the pharmacist could be utilized. It should be the special duty of the country practitioners to advise regarding general preventive medicine and for the druggist to assist the physician in this work giving special attention to the use of medicaments which are of unquestioned value in the treatment of ailments, and using every effort and influence to overcome the tendency to resort to the use of patent and quack remedies. It is in the rural districts where

the medical frauds reap their harvest. What the farmer wants is some simple sound advice to steer him clear of the quacks and aid him in a better mode of living. The university should place this work in the hands of men who are competent by training and experience."

Educational Articles for Public Health Nurses

"The *Public Health Nurse Quarterly* intends to publish during this coming year a series of articles which, as a whole, will represent in greatly condensed form some of the more important courses of study which are being presented to postgraduate students in public health nursing at Teachers' College, Columbia University, New York, and at three postgraduate centers in connection with the Visiting Nurse Associations in Boston, Philadelphia and Cleveland.

"These articles are to be written by the men and women who lecture at these schools, and will be presented by them in a way to make more general some of the essential principles which characterize and form the basis of constructive nursing for the public health.

"The following is a very incomplete list of some of the subjects treated in these postgraduate courses:

- "1. Principles and Procedures of Public Health Nursing.
- "2. Municipal Sanitation.
- "3. Rural Sanitary Problems.
- "4. Basis of Social Legislation.
- "5. Preventive Medicine in Nursing.
- "6. Food Economics.
- "7. Psychology as Applied to the Problems in Public Health Nursing.
- "8. The Immigrant and Social Backgrounds.
- "9. Administration in Public Health Nursing."

The *Public Health Nurse Quarterly*, January, 1914.

Medical Inspection of English Schools.

The *Journal of State Medicine*, December, 1913, tells of the method which has been introduced in England to put the medical inspection of school children on a sound basis. We quote the article entire as follows:

"The Board of Education has recently

issued new regulations in respect to grants for the medical inspection and treatment of elementary school children. Provided that the board is satisfied that medical inspection and treatment are satisfactory, they will hand over roughly one-half of the expense incurred to the authority. Such a step as this should prove both a relief and a stimulus to the education authorities. In the case where satisfaction has not been given to the board, they may reduce or withhold the grant altogether. "A Royal Commission has testified that the real means of improving the physique of the nation lies in the detection and cure of disease in childhood. The board mentions as two of the points to which special attention will be given in assessing the amount of the grant: (1) The extent to which school medical service is coördinated with the local public health service; (2) the provision for rendering it an integral part of the local system of elementary education. It will, therefore, be seen that the first point aims at economy, the second makes for efficiency and uniformity. In the case of children suffering from tuberculosis or other ailments requiring open-air treatment, a maximum grant of £3 will be paid per unit of average attendance in the case of open-air day schools, and £8 per unit in the case of open-air residential schools."

[Railway Sanitation.

The following clipping from the *Medical Press* indicates that conditions of railway sanitation in England are as primeval as in this country. The type of American car referred to is unfortunately rare.

"Cleanliness is comparative. Railway trains are now cleaner, no doubt, than they were twenty years ago, but they are still far from being perfect. The companies are providing more sanitary accommodation of some sort or another, but their standard is still far below what should be tolerated. Lavatories at stations are on the whole fair, and the more odoriferous examples are not so much the fault of the system in vogue as of its application. The glaring faults lie in the methods of disposing of sewage on trains. To scatter human excreta broadcast along a track should be unthinkable in an

age such as ours. Railways run through thickly populated country, and expresses dash through our largest towns leaving behind them matter at the best offensive and at the worst dangerous to life. Water supplies to cities are carefully chosen. Mountain streams are tapped and their pure water carried for miles so that their city may be safe. At any moment these streams may be contaminated by a defecating passenger, and this danger is the greater because it is wholly unsuspected. Some American companies make arrangements for the sewage to be removed from cars when they are on sidings for the night. There is no reason why some such system should not be universal. The present one, at any rate, is an intolerable anachronism. It is not many years since a serious outbreak of typhoid fever among railway navies on an American line was proved to be due to contamination of the line from passing trains."

An English Tuberculosis Dispensary.

The following brief note from the *Modern Hospital* of December, 1913, tells of a method of organization for the fight against tuberculosis which not only sounds very promising but appears to have met with success as far as it has gone:

"Birmingham has always been a city in which the importance of linking up the various health agencies and after-care organizations has been recognized. The latest addition to its preventive work, since after-care must be included in that term, is the new tuberculosis center and city analyst's laboratory, says the *London Hospital*. It consists of a waiting hall, with consulting, inoculation, and dressing rooms for both sexes and a joint dispensary on the ground floor. The upper part of the building is occupied by Mr. J. Liversege's laboratory as city analyst. The aim, of course, of the center is preventive and consultative work. It will be a center for the examination of "contacts" and a general information bureau open to every citizen. As a center for educational propaganda also it is hoped to do much good work, and during the winter there is a project for holding a course of lectures to patients and their friends. At

the present time—for part of the institution has been in use for some six months—900 patients a week are being dealt with. Few things have been more remarkable in institutional development of late years than the way in which the dispensary has grown from a single department into a unit embracing educational, consultative, and specialized branches. The dispensing is now only one part of what is virtually a new institution which the word 'center' not inaptly describes.

Public Welfare Workers.

"The people of Chicago, under the leadership of President A. A. McCormick, of the Board of County Commissioners, have decided to drop the term 'Social Service' as applied to those who are engaged in work for the betterment of the poor and sick, and to use instead the term 'public welfare.'

"The new term really had its christening on the evening of November 22 at a great dinner at the Sherman House in which several hundred 'public welfare' workers participated. Dr. Richard C. Cabot of Boston, one of the guests of the occasion, eulogized the new phrase as expressing more than any other term he had heard used in the same connection.

"President McCormick deprecated any reference to his own part, either in the discovery of the new term or in the work to which it applied. He said that it had been his experience that almost every new idea that was concerned in the welfare of the people came from some woman, and that the coinage of 'public welfare,' as expressive of what we have been calling social service, was a woman's work."

The Modern Hospital, December, 1913.

Rehabilitation of Boiled Milk.

"So well have we been trained by the child specialists and the sanitarians, that most of us look on boiled milk as a simply impossible food for babies. But it is the boast of medical science that she never stands still and what we look on with horror one day, we may have to embrace the next.

"Boiled milk has always maintained its place as food for infants on the continent, but has had few champions in England or America, Dr. Abraham Jacobi being almost

the only pediatrician of note in this country to use it. Recently, however, it has been subjected to an exhaustive examination in England and has come through with flying colors.

"One of the government Blue Books contains a report on the 'Biological Properties of Milk,' made by a woman doctor, Janet Lane-Clayton. That boiled milk forms in the baby's stomach a much more delicate and friable curd than raw milk is a well-known fact and in Germany, where its use is general, physicians have always claimed that less trouble was experienced from infant diarrhoea in bottle-fed babies than here or in England, where raw milk is used (pasteurized milk has not gone through the changes which boiled milk has and counts as raw in this respect). Even in America boiled milk is sometimes used to check diarrhoea.

"However, we have been taught not only that boiled milk is constipating, but that the heat has destroyed ferments and other biological substances essential to nutrition, and that babies will starve on a diet of boiled milk.

"As for the first of these objections, it is now asserted that constipation is so light an evil, compared with diarrhoea, that the physician hails it with something like relief.

"As to the second, Dr. Lane-Clayton goes exhaustively into the question of the heat-sensitive biological substances in cow's milk and concludes that the ferments which have always been looked upon as so essential are really not present at all in pure milk, but are always derived from bacteria.

"The other substances, those concerned in producing immunity to disease, are found only in the colostrum and, if they appear in any quantity in the later milk, it is as a result of inflammation of the mammary gland. But even more, the capacity to absorb these substances from the digestive tract is lost after the first few days of life and therefore, 'the oft repeated assertion of the value to the infant of raw cow's milk fades away when the facts are examined, since in cow's milk it is found that these so-called biological substances are not absorbed in the alimentary canal, but are destroyed there.'

"On the whole the conclusion of the report is that between raw cow's milk and boiled,

the advantage is with the latter, as boiled milk is germ-free or nearly so, does not form a hard curd and if not raised above the temperature of boiling water, the heat has not destroyed or apparently injured any of the chemical substances necessary for the health of the child.

"It must be remembered that the comparisons are between raw milk and cooked milk of *another species*. The results would be quite other if we compared raw and boiled human milk.

"One or two evangelists are not enough to bring about a reformation and we shall not see pasteurized milk giving way to boiled milk at once. But it would be a happy day for municipal health authorities, for institutions, and for visiting nurses if the results of this English report came to be generally accepted and the complications of pasteurization were succeeded by the simplicity of boiling."

Alice Hamilton in *The Survey*, December 13, 1913.

The Cost of the Tuberculosis War.

"Out of nearly \$20,000,000 spent last year in the treatment and prevention of tuberculosis in the United States, 69.3 per cent. of the money was derived from public funds, either Federal, state, county or municipal. These are some of the interesting figures given in the annual statistical statement of the National Association for the Study and Prevention of Tuberculosis, recently made public. The statement is based largely on actual reports received from anti-tuberculosis agencies throughout the country, but where reports were not available, the figures have been estimated.

"Treatment of tuberculous patients in the more than 500 sanatoria and hospitals of the country and the construction of such institutions cost over \$18,000,000 of the total expenditure. * Care of patients in dispensaries and open-air schools cost about \$825,000. Anti-tuberculosis associations and committees spent nearly \$675,000 in furthering their work of organization and education, while state and local boards of health and special tuberculosis commissions spent over \$250,000.

"More than \$13,800,000 or 69.3 per cent.

of the total expenditures came from public funds. The National Association points to this growing increase in the spending of public money for tuberculosis as one of the most significant facts in the report, as it indicates the shifting of the burden of institutional care of consumptives from the private purse to the general public purse, where it rightly belongs. Since 1909 the percentage of public money spent in tuberculosis work has increased from 53.5 to nearly 70 per cent.

"New York state spent more money in tuberculosis work than any other two states, due largely to the increased and growing activities of city and county governments in building adequate hospitals for consumptives. The following table shows the estimated public and private expenditures in each of the five leading states:"

EXPENDITURES IN 1913.

State.	Public.	Private.	Total.
New York....	\$3,455,638	\$1,429,196	\$4,884,834
Pennsylvania .	1,629,195	458,099	2,087,294
Illinois.....	1,341,289	533,810	1,875,099
Massachusetts	1,138,521	300,158	1,438,679
California....	330,322	492,293	822,615

The International Hospital Record, February 5, 1914.

New Method of Sewage Treatment.

"Recent experiments at the Lawrence Experiment Station of the Massachusetts State Board of Health, as described in the article by H. W. Clark and G. O. Adams in the *Engineering Record* of February 7, suggest that aëration of sewage for a period of some five hours in a five-foot tank containing vertical layers of slate about one inch apart may be utilized to greater advantage than hitherto thought possible. It appears that a substantial portion of the increase in stability, or reduction in the putrescibility, of the sewage is due to the clarification brought about by elimination of the semi-soluble organic matters frequently spoken of as "colloidal" matter. This separation of non-settling substance contributing largely to the putrescibility of the sewage is promoted by the aëration and also by the growths or deposits which occur upon the surface of the slates. The tank is operated on the fill-and-draw plan, the sludge and detached growths from the slate surfaces quickly settling to the bottom of the tank after aëration ceases.

"Direct oxidation of organic matter is not a controlling factor in removing organic matter, as indicted by numerous earlier investigations, and also by recent tests at Lawrence. It is important to note, however, that the treated sewage is claimed to have lost all of its offensive odor.

"In some ways these important investigations give promise of more efficiency in bringing about the "de-solution" of objectionable non-subsiding organic substances than could be reasonably expected from studying any of the results of the experiments of Dr. Travis at Hampton, Norwich or elsewhere, or of Mr. Dibden at Devizes or elsewhere. Aëration seems to promote the separation of colloids to a greater extent than anticipated by the English investigations or by Black and Phelps, who worked with tanks containing no slates or other colloids.

"The amount of air required seems to be comparatively small, both in point of quantity and expense. The experiments at Lawrence are striking in the elimination of odor from the sludge and the aid which the treatment is as a preliminary to filtration of the local sewage at rates far in excess of those hitherto employed in practice. It is stated that the purification data apply either to fresh or stale sewage.

"A possible difficulty arises in that the aëration of sewage may of itself cause a serious nuisance from odors, such as reported in the aëration experiments of Dr. Dupre in London in the early '80s. This might be specially marked with stale sewages.

"On the whole, the experiments are noteworthy in suggesting the beginnings of a new style of treatment, which, however, ought to be tried out on a larger working scale before final conclusions are drawn as to its usefulness for plants in practice."

Sewage Purification—New Jersey.

With the present rapid increase in the number of installations of sewage systems and sewage disposal works and of water supply and water purification systems the Board of Health of the state of New Jersey has found it advisable to draw up a set of rules governing the submission of designs

for such works. R. B. Fitz-Randolph, chief of the Division of Food, Drugs, Water and Sewage, in writing relative to the rules says that before their adoption plans were submitted "in all sizes up to six feet by ten feet and on all kinds of paper from the wrapping kind up to tracing cloth."

He continues: "It is also an unfortunate circumstance that some few engineers who have worked along other lines will accept work designing municipal sewage disposal or water purification plants apparently without investigating the underlying principles as thoroughly as is desirable. It then becomes necessary for the state authorities to gather detailed data regarding the project which very often cannot be done as efficiently as would be best because of the small number of engineers which may be employed with the present annual appropriation.

"The present rules are, therefore, intended to prevent loss of time incident to the collection of fundamental data, upon which the design is based, and also to make the plans and reports more uniform in character.

"Before taking final action upon the regulations they were submitted to several of the leading sanitary engineers, with the request that comments and criticisms be made. It was the intention of the board to see that no unjust provisions should be included which would cause unnecessary expense or hardship upon the part of the engineers. Many helpful suggestions were made by these engineers, and the board desires to express their appreciation of the time and trouble which was taken in making the replies.

"The regulations were prepared by C. G. Wigley, engineer of the board, under the supervision of R. B. Fitz-Randolph, chief of the Division of Food, Drugs, Water and Sewerage, and adopted by the Board of Health of the state of New Jersey June 23, 1913."

That the regulations are good and that there is a demand for them is attested by the fact that the State Board of Health of Louisiana has already adopted the same set of rules almost without change. It may be found that this furnishes a good beginning for an even wider-spread standardization of health work.

INDUSTRIAL HYGIENE AND SANITATION.

American Labor Legislation.

It is extremely encouraging to note the optimistic tone of the last *American Labor Legislation Review*. (December, 1913).

The marked contrast between conditions of the past and those of the present are vividly shown.

"The old idea of labor law enforcement, of policing a state, no longer commands respect. The 'detective method,' valuable and necessary as it is at times in uncovering hidden violations of the law, is nevertheless to be condemned when it becomes the habitual form of inspection. An army of the most skilled factory inspectors would be totally unable to enforce every provision of the factory laws. Moreover, few inspectors, even with previous technical training, would be able intelligently to pass upon proper provisions for safety, comfort, and health in a succession of establishments including processes and danger points so extremely varied."

The fundamental defects of earlier legislation were threefold: first, the incompleteness of the labor laws, allowing many danger points to go unguarded; secondly, the absence of direct responsibility, thus placing no obligation upon the employer to safeguard the employee except "as the commissioner so directs," and thirdly, the absence of well defined provisions for safety and health, leaving an indefinite law to be enforced by a poorly trained and poorly paid inspector. The results, of course, were very unsatisfactory, but were no less than might well have been expected.

In view of past conditions the following words are not a little gratifying:

"Within the last three years we have entered upon a new era in factory inspection. The recognition that administration is the most important problem in labor legislation is working a revolution in this field. There is a new spirit in the work—the spirit of coöperation. The practical experience of

the worker, the resourcefulness of the employer, the critical, constructive ability of the expert—all are needed in the framing of reasonable standards of protection. It is the lack of coöperation of these three groups in the past that has left unnumbered thousands yearly to suffer for the want of protection; it is the new spirit of coöperation in the administration of labor laws that is the promise of the future."

It is pleasant to be able to congratulate the efficient officers of the American Association for Labor Legislation not only on the excellence of their quarterly publication, but on the beneficial activity displayed in all fields of betterment of industrial conditions.

The Cost of Preventing Occupational Diseases.

The November number of the *Monthly Bulletin of the Ohio State Board of Health* discusses this topic at some length. Certainly the agreement that the cost of appliances to prevent occupational accidents and diseases will add to the already high cost of living is the most flimsy of all, since the cost of accidents not only falls upon the people as directly but is much greater than the cost of prevention. For example, the State Actuary of the Ohio Liability Board of Awards reports 1,220 eye injuries costing \$23,000. Of these 99 per cent. were preventable and \$500 would have paid the cost of prevention. The article says:

"We cannot expect the risks of a trade to be borne entirely by the tradesman, who has only partial control, if any, over them.' If it is dangerous to human lives to manufacture a certain article, then the cost of manufacturing should include the cost of the conservation of health.

"The expense of maintaining hygienic and sanitary conditions of work, and of instructing workmen and disciplining them must be charged, as is the cost and up-keep of machinery, to the cost of the goods manu-

factured. Several experiments along this line have already shown that the increased cost of goods to the public has amounted to less than 3 per cent. to accomplish these things, while, when such changes are universally made the decrease in the cost of private and public charities is marked. Witness the result in the United States Army and Navy, and at Panama. Typhoid fever, smallpox and tropical diseases have been practically wiped out while venereal diseases are rapidly on the wane, all due to measures of prevention.

"Money put into hygiene and sanitation of any character must be regarded as an investment, from which definite returns are to be expected, and must not be considered in any sense an unprofitable expenditure.

"Money spent on so-called 'workmen's welfare' is merely a policy of business economy with many angles to it, and not a matter of philanthropy."

Spreading the Knowledge of Industrial Poisons.

"Some eight years ago a committee representing four great European countries, namely, Great Britain, Germany, France and Italy, was named to study the conditions of the industrial world which were directly responsible for diseases caused by obnoxious substances; the kinds of poisons causing the diseases, and the methods to be used in prevention. After nearly eight years' work this committee has prepared a complete list of the poisons which are found in occupations. In order that the physicians of Ohio and those manufacturers who are interested in this subject may have a better understanding of this phase of industrialism, we are reprinting this report, translated from the German, in this issue of the *Monthly Bulletin*. It may also be found in the United States *Labor Bulletin No. 100*. The relationship between industrial poisons and poisoning is clearly seen. It is interesting, however, to know that this entire list of poisons, comprehensive as it is, still constitutes probably less than 10 per cent. of the causes of disease conditions which are associated with occupations. By this we mean those conditions which cause anemia, tuberculosis, pneumonia,

Bright's disease, heart disease, nervous afflictions, premature old age and other diseases which follow direct exposure to non-poisonous dusts and irritants, as well as extremes of heat, cold, fatigue and like conditions.

"There is no question but that the manufacturer who faces this phase of his industry and uses the proper means of prevention will be increasing his dividends, as the loss or even temporary disability of an experienced employee must of necessity have its economic considerations. In some instances definite measures must be taken to prevent the inception of the poisons mentioned; however, we would particularly call attention to the short summary at the end of the list, specifying the general means to prevent practically all of the occupational diseases due to these poisons."

Monthly Bulletin, Ohio State Board of Health, December, 1913.

Problem in Mortality Statistics.

At the XV International Congress on Hygiene and Demography, Dr. Jacques Bertillon, as the representative of France, gave an interesting address upon "Occupational Mortality and Causes of Death." Doctor Bertillon confined himself chiefly to the discussion of the difficulties that confront the statistician of occupational mortality.

The speaker dwelt at length upon the technical difficulties involved in the compilation and interpretation of trustworthy tables of mortality. He said in part:

"Nothing requires more discrimination than the construction of tables of occupational mortality. Obviously the calculation of this ratio, 'To 1,000 butchers, how many butchers died?' presupposes that one knows: (1) the number of butchers living; (2) the number who died. Now one cannot know either of these numbers exactly. In fact, on the census day a certain number of butchers think they answer the question about their occupation correctly with the word 'merchant' without saying what sort of business they carry on. But worse still, one has no assurance that he who declares himself a 'merchant' will be so designated on his death certificate. To further complicate

the situation it is found that in mortality reports the words, hosiers, hatter, clothier, etc., are applied to those who manufacture and also to those who merely sell."

From the above considerations and others, the speaker draws the conclusion that "It is not wise to calculate mortality except for the most clearly defined occupations."

The necessity for studying occupational mortality in connection with age cannot be too highly emphasized. For example, landlords show a high mortality, although their occupation is neither laborious nor unhealthy. The explanation is that men do not ordinarily become landlords until late in life, and consequently they have the mortality of the aged. On the contrary, soldiers are found to have an apparently low mortality, but this is due to the fact that soldiers as a class are young. When their mortality is considered with reference to age, the death-rate is found to exceed the average for that age.

Furthermore, many occupations demand only strong men to carry them on. When the worker's strength finally gives way he turns to some less strenuous occupation, thus producing a low mortality in the former occupation and a high mortality in the latter.

The subject is of unquestioned interest to the statistician, and, if anyone should desire a more comprehensive discussion of the subject, it may be had in the *Recueil de Statistique Municipale de la Ville de Paris*, Vol. III, No. 4.

The Significance of Fatigue in the Industries.

The importance of fatigue in connection with the occurrence of occupational disease and accidents has only recently been recognized and given scientific consideration. The subject, however, was discussed somewhat at length at the XV International Congress on Hygiene and Demography, held in Washington in 1912. These addresses were subsequently printed in volume III of the "Transactions" under the subject of "Hygiene of Occupations."

In speaking of the "Effects of Temperature and Humidity on Fatigue," Dr. Frederic S.

Lee concludes his remarks with the following summary:

"When an individual is subjected to an atmosphere that is charged with an excessively high temperature and high humidity, his bodily temperature is raised, his working power becomes limited, and there is an early oncoming of fatigue. In addition to the normal fatigue substances there are present other substances, products of an abnormal metabolism, perhaps of increased protein disintegration, which likewise act as fatigue substances. Both the normal and the pathological fatigue substances act toxically to diminish the activity of the tissues, and such fatiguing action is rendered greater by reason of the abnormally high internal temperature that is present."

The importance of these physiological and pathological effects of high temperature and humidity is rendered quite evident when one considers the several industries where such conditions are prevalent. In this class would fall such as mining, baking, laundering, and some kinds of cotton weaving. The peculiar nature of these make it necessary that more than average precautions be taken to render the employees safe and efficient.

Dr. Shepherd Ivory Franz, of George Washington University, delivered an address, entitled "Fatigue Factors in Certain Types of Occupations," in which he gave the results of experiments on (1) the relation of the speed of performance to accuracy, (2) the relation of the extent of the movement to its accuracy, and (3) the effects of changing of speed upon the accuracy of performance.

The experiments themselves were quite simple, yet they involved in their proper relations the elements of time, accuracy, and movement. The subjects under observation were required to strike at small circles with the point of a pencil. The rate of movement was determined by the aid of a metronome. The extent of movement and the rate was varied greatly in the several series of experiments and the accuracy recorded in terms of hits and misses. The results can best be stated in the author's own conclusions:

"1. Fatigue is evidenced by inaccuracies of movement, as well as by the lengthening of

the time of movement and by a decreased performance of mechanical work.

"2. With increased speed, error increases, but the error increase is much greater than that of speed.

"3. In extended series of movements at high speed there is a tendency toward a lack of coördination.

"4. The error, or fatigue effect, at slow speed, at the end of about 600 movements, is about the same as that at medium speed after about 500 movements, and that at medium speed, at the end of about 6,000 movements, about the same as that at high speed at the end of about 500 movements.

"5. Changing the rate of movement increases the proportionate errors, making them greater than those when the speed is a constant, and decreasing the speed increases the proportionate errors, although not proportionately as much as when there is an increase in speed.

"6. The inaccuracy in movement increases as the extent of the movement increases, but is not directly proportional."

From these results it is obvious that the relation of accuracy to time and movement furnishes a very practical problem for those industries where high speed is maintained and where the practice of 'speeding up' is indulged in.

The question of fatigue will doubtless receive greater attention in the future, not only from the standpoint of public health at the hands of the hygienists, but also from the standpoint of efficiency and good business policy by the employers themselves. That much susceptibility to disease, and, therefore, disease itself is due to fatigue and resultant weakened vitality from the high nervous and muscular strain in industrial work, can hardly be questioned. That many industrial accidents are due to the same cause needs but little proof. That the employer himself would profit by minimizing the fatigue, and thereby conserving the energy of the worker, is, without any attempt at proof, at least a feasible proposition.

The Joint Board of Sanitary Control.

One of the best examples of coöperation in sanitary matters between the employer and

the employed is to be found in the cloak and suit industries of greater New York. Constant unrest in the industry, with several successive strikes and subsequent loss to both the workers and manufacturers, led to a final settlement in 1910 by the famous "Protocol of Peace," which provided for settlement of disputes by arbitrations and for the establishment of a Joint Board of Sanitary Control to adjust all matters pertaining to hygiene and sanitation.

The board consists of two nominees of the Manufacturers, two nominees of the Unions, and three to represent the public. This board has full power to set standards of sanitation which both the Manufacturers and the Unions are obliged to maintain to the best of their ability.

The first half-year's work consisted merely in collecting data concerning the existing conditions in the industry. It was found that with only one exception none of the shops were in a thoroughly good condition from the standpoint of sanitation and fire prevention. The chief dangers to life and health were found to lie in the inadequacy of protection against fire, lack of toilet and washing facilities, inadequate ventilation, improper lighting, general uncleanness, and certain harmful effects peculiar to the industry.

The work has now been pursued for over three years, the third annual report being issued in December, 1913. While the board is free to state that the conditions are not as they should be even yet, the report shows that the results thus far obtained are very gratifying, indeed. The number of shops and buildings with no fire-escape have been reduced from 25 to 19; using artificial light, from 373 to 29; with no protection from glare, from 1,037 to 15; with improper toilet facilities, from 142 to 7; with foot power used, from 469 to 235, etc. These are only a few from a long list of items, but they are sufficient to show a marked improvement of general conditions.

The fundamental principle underlying the movement, namely that of coöperation between employer and employee, is the key to many of our social ills, whether sanitary or otherwise. It is practically impossible to

inject cleanliness and carefulness into a wilfully careless and filthy individual. The success of the above plan, therefore, depends upon the earnestness of the contracting parties as well as upon the integrity of their representatives. These two essentials seem to be assured in the case of the industries under consideration, and it is to be hoped that others will profit by the example they have set.

Employers' Welfare Work.

The employers' welfare work has been a subject for keen controversy since its very beginning, one side supporting the movement because of the much needed relief given the workers, the other opposing the work because of the selfish motive and the alleged paternalism underlying the movement. No one doubts the good afforded the workingmen, and the employers admit frankly that it is a good business policy and results in a better labor force; but regarding the paternalism there seems to be scant evidence for the allegation.

Bulletin No. 123, of the U. S. Bureau of Labor Statistics, by Elizabeth Lewis Otey, Ph. D., contains the report of a study of the employers' welfare work in the United States. Regarding the pro's and con's of the question, the author says:

"There is a tendency in labor circles to condemn employers' welfare work. It is claimed that much of it is tinged with paternalism and fosters a spirit of dependence on the good will of the employer incompatible with the aims of labor, and as a result the workers never reach their full development. The demand is for rights, not charity; that workers be paid enough and then left to order their lives as they see fit. It is rather taken for granted that welfare work is done at the expense of wages; that if the employer were without this particular fad the sum expended on it would be added to wages. This view is based on an assumption impossible of proof, but a priori argument is of course against it, as welfare establishments, paying a lower wage, would be unable to compete in the labor market with the ordinary establishment doing no welfare work.

"A further objection to welfare work is that it is begun and maintained to prevent strikes and labor organizations. Obviously this position is well taken. To cite French experience, the verdict there is that establishments with welfare work have been less exposed to labor troubles than those without.

"There is, on the other hand, quite a strong sentiment in favor of welfare work. In a large philanthropic society, composed chiefly of capitalists and employers, a special welfare department has been organized with committees in different parts of the country especially to interest employers in improving the working and living conditions of their employees. Their methods are educational, 'conservative and non-aggressive.' The endeavor is to show employers what other employers have done for their employees, and to make 'tactful and comprehensive suggestions' to them."

In the above investigation there were visited about fifty establishments of a widely varied nature, including manufacturing and mercantile establishments, and public utilities. Space will not permit of a detailed discussion of the many features of the welfare work, but it might be of interest to our readers to merely enumerate some of the great variety of helpful measures taken by employers to insure the safety, health, comfort, and pleasure of their employees. A few of the more characteristic are as follows:

Kitchens, lunch rooms, and restaurants conducted at cost.

Rest rooms and dressing rooms.

Washing and bathing facilities, with soap, towels, and lockers.

Libraries and clubhouses.

Sanitary inspectors.

Proper heating, ventilation, and lighting

Safeguarding of machinery.

Dust removal.

Desirable cottages at low rent.

Landscape gardening.

Fields and equipment for athletic games.

Vacations with full pay.

Advance of salaries according to merit.

Lectures and entertainments.

Night schools, and apprenticeships, and preliminary training.

Visiting nurses, and emergency hospitals.

Sick benefits, accident insurance, and pension systems.

Mutual benefit associations.

Profit-sharing, and savings banks.

These few typical examples show the broad field available for welfare work, and it is to be hoped that they may prove suggestive to those employers who are not doing their share to render the conditions of their employees safe and desirable. To quote Doctor Otey in conclusion, we can all agree that, "The sphere of welfare work would appear very definitely marked. Where the standard of living of employees is low, where illiteracy is prevalent, where an increase in wages fails to call forth increased industry on the employees' part, but merely means idleness and stopping work until the surplus is spent, where shiftlessness and extravagance are common characteristics, the employer's efforts to better such conditions are welcomed."

Office Sanitation.

Doctor Howarth, medical officer of health for the city of London, gave an address at a recent meeting of the Women Sanitary Inspectors' Association in which he discussed "Sanitation and Sanitary Law as Affecting Offices and Office Workers." He showed that while the mortality rate for clerks was lower than among other occupied males the tuberculosis death-rate was above the average. He points out that the sedentary nature of the work, the cramped position, the strain on eyesight and the general loss of tone consequent upon all these evils made a higher standard of sanitation necessary in offices and that they should be included in the term "workplaces" so that the same standards of cleanliness, lighting, ventilation, toilet accommodations, etc., should apply to them as to the shops usually covered by the term.

He suggested the following additions to the Public Health Act:

"(1) A definition which would specially bring certain places within the meaning of the word "workplace," *e.g.*, offices and restaurant kitchens.

(2) Increased powers for dealing with

underground offices, on the lines of the Underground Workrooms Bill.

(3) Underground offices to be notified to the local authority for registration and inspection. This principle, if its value were proved, might be eventually extended to all offices.

The Safety Movement.

"Public recognition of well-doing is of more importance to a corporation than to an individual. The latter gets from it a little personal satisfaction, or, at best, a stimulus to increase his effort in the proper direction. Commendation of the corporation, however, does more than bring satisfaction to the constituent individuals or stimulate them to greater personal effort. It promotes faith and pride in the organization, a feeling that united efforts are more productive than those that are scattered. The organization whose employees are proud of its achievements and go out of their way to tell about them is marked for success. It is for this reason, that the award of safety medals by the American Museum of Safety is of such importance. The employees of the United States Steel Corporation, of the New York Telephone Company, of the Allgemeine Electricitäts Gesellschaft, and of the Southern Pacific will be stimulated to greater efforts along safety lines now that their work has been recognized. The spirit of competition, too, will stimulate other corporations and their employees to greater activity."

Engineering Record, December 20, 1913.

Grinding Wheels.

The dangers incurred in operating grindstones and emery wheels are very clearly and compactly set forth in two pamphlets, entitled "Grinding Wheels" and "Safety as Applied to Grinding Wheels," published by the Travelers Insurance Company and the Norton Company, respectively. In these pamphlets a very complete discussion of the subject is given, accompanied by copious illustrations of the various devices for preventing accidents.

The following are given as the commonest causes of accidents:

Fouling of work between the rest and the wheel.

Improper mounting.

Overspeed.

Heating of the spindle, and resulting expansion, when bearings run hot.

Excessive pressure of work against the wheel, and the consequent heating of the rim.

Allowing spindles to become loose in the boxes through wear.

Allowing wheels to get out of true.

Carelessness.

Too much emphasis cannot be placed upon the necessity for guards against breakages and protection from dust. Sometimes these two ends are accomplished by a single device which is a combination of a protection hood and dust hood. Where a dust hood is not attached it is necessary for safety that goggles be worn when grinding is done.

Invaluable suggestions are given in the above pamphlets in regard to proper mounting, safe speed, testing of wheels, protecting hoods and flanges, speed changing, and the like.

One of the chief difficulties in remedy in conditions lies in the reluctance of the workmen to use the various safety devices and to take the necessary precautions against accidents. The objections to the use of safety devices are, doubtless, more imaginary than real, and arise from an inherent dislike to discard old habits and to form new ones. It seems advisable to institute a campaign of education against this natural inertia of the workmen and thereby enlist their earnest support for the safety movement.

Scaffolds.

The Illinois Steel Company has issued a very valuable pamphlet dealing with the proper construction specifications and operating rules for scaffolds. The compilation was made by the safety committee of the company and while the treatment of the subject concerns itself especially with the steel industry, it, nevertheless, is of general application to scaffolds in any construction work.

Regarding the construction specifications, the proper quality and size of the lumber is specified, and general formulae are given

for columns, flexure of beams, standard steel pipe beams, etc. Specifications for flooring, swinging scaffolds, pipe needle beams, suspension of scaffolds, roof truss scaffolds, and the like are given in detail. Also a detailed description, with plates, is given of the various kinds of scaffolding necessary for the construction and repair of smokestacks.

The committee has added a list of general instructions for the safe operation of scaffolds. They are substantially as follows:

All lines, hooks, tackles, slings, lumber, etc., shall be inspected before being used.

Only experienced and reliable men shall be employed in the construction of scaffolds.

When a tackle rope is in danger of being affected by heat, a workman shall be left below to take care of the surplus rope.

Rope knots shall have ends tied with smaller cord, to prevent them becoming untied.

Condemned ropes shall be so destroyed that they cannot get back into service.

Hot blast stoves or stacks shall not be painted when hot enough to char or injure ropes.

All needle beams, supports and flooring of scaffolds shall be thoroughly tested by at least double the load which they are to carry, before being used.

When scaffolds are supported by tackle, the scaffold shall be raised a few feet from the ground and tested by at least double the load it is to support, before it is raised to position.

All temporary scaffolds shall be removed as soon as work is completed.

Every employee, before going upon any scaffold of any description, must see for himself that the scaffold and its supports are properly built.

Men working at high elevations, from which they are liable to slip, or when working on smokestacks of scaffolds supported by tackle, shall, when practicable, wear safety lines and belts.

The above rules are of general application and may well be followed by anyone who has to do with the operation of scaffolds. The circulation of such literature among workmen will undoubtedly aid in lessening the number of preventable accidents.

Garment Workers vs. Tuberculosis.

When the working people reach a place where they take care of their health without being forced to do so the outlook for effective work by the health officer becomes promising. The following note from the *Journal of the Outdoor Life* strikes a very hopeful note:

"A permanent injunction and a 'closed shop' against tuberculosis might be said to characterize the stand recently taken by 9,000 members of the Cloak and Skirt Makers' Union in New York City and made public in the third annual report of the Joint Board of Sanitary Control, just issued.

"A preliminary physical examination of 800 workers, undertaken in 1912, showed over 62 per cent. suffering from one or more diseases. Accordingly a lively educational campaign was started among members of the unions, to point out the danger of working in shops side by side with sufferers from tuberculosis, and the mutual advantage of making it possible for such sufferers to withdraw

from active work until their condition is improved.

"A proposition to raise a joint annual fund for tuberculosis insurance from manufacturers and employees met with vigorous opposition from the union and was voted down. However, the board continued its propaganda throughout the winter and last March, after a referendum vote, Local No. 35 of the Cloak and Skirt Makers' Union, consisting of 9,000 pressers, adopted a resolution establishing a tuberculosis benefit for its members, supported by a per capita tax of one dollar a year. In addition to providing for medical examination of all suspected cases in the union, the resolution called for admission, and the rejection of any suffering from tuberculosis.

"Of 994 members of Local 25 examined, sixty-five, or 6.5 per cent., were suffering from tuberculosis, while among the 45 workers from other locals sent for examination, ten, or 22.2 per cent., were tuberculous. These percentages are, obviously, very high."

CURRENT PUBLIC HEALTH LITERATURE.

AMERICAN.

Albany (N. Y.) Medical Annals.

XXXV, No. 2. Feb.

Albumin Reaction in Sputum of 228 Cases of Pulmonary Tuberculosis. E. Corning.

American Journal of Diseases of Children, Chicago.

CLXX, No. 5. Feb. 5.

Pellagra in Early Childhood. W. Weston.
Value of Blood Picture in Early Diagnosis of Measles, Especially in Relation to Question of Isolation. W. P. Lucas.

American Journal of Tropical Diseases and Preventive Medicine, New Orleans,

I, No. 7. Jan.

Influence of Water-Borne Disease on Mortality of Children. A. J. McLaughlin.

Boston Medical and Surgical Journal.

CLXX, No. 5. Feb. 5.

Program of Practical Measures for Mental Hygiene Work. H. R. Stedman.

California State Journal of Medicine, San Francisco.

XII, No. 1. Jan.

Hydrophobia in San Francisco. R. G. Broderick.

Points in Tuberculosis of Interest to Health Officers. R. A. Peers.

Relation of Sanitarian to Vocational Guidance. W. Simpson.

Modifications in Administrative Measures Necessitated by Carrier Problem. F. W. Browning.

Recent Legislation on Communicable Diseases in United States. J. N. Force.

Administrative Measures for Control of Scarlet Fever. J. J. Benton.

Engineering News.

LXXI, No. 3. Jan. 15, 1914.

Garbage and Refuse Incineration for San Francisco. S. H. Nishkian and H. A. Minton.

LXXI, No. 5. Jan. 29.

Relation of Purity of Water Supply to Typhoid Fever at Cincinnati, Ohio. J. W. Elms.

LXXI, No. 6. Feb. 5.

Combination Cesspool and Septic Tank. J. F. Duling.

Report of Sewage Testing Station at Akron, Ohio.

LXXI, No. 9. Feb. 26.

Removal of Iron and Manganese from Water.

LXXI, No. 9. Feb. 26.

An Ice-Emergency Water Intake at Waukegan, Ill.

Engineering Record.

LXIX, No. 5. Jan. 31.

Sanitary Survey of Boundary Waters Between United States and Canada.

LXIX, No. 6. Feb. 7.

Sewage Treatment at Sturgis, Mich.
Chlorination Recommended for Buffalo.

Sewage Treatment by Aëration and Contact in Tanks Containing Layers of Slate. H. W. Clark and George O. Adams.

Purifying Water in an Indoor Swimming Pool.

LXIX, No. 8. Feb. 21.

Laying Out of New Water-Supply System for Victoria, B. C.

Results of Sewage Treatment at Columbus, Ohio.

Journal of the American Medical Association, Chicago.

LXII, No. 6. Feb. 7.

The Air as a Vehicle of Infection. Charles V. Chapin.

Investigation of the Prevalence of Malarial Fevers in the United States by the United States Public Health Service. R. H. von Ezdorf.

LXII, No. 7. Feb. 14.

Effect of Lactic Acid Bacilli on Diphtheria. S. T. Nicholson and John F. Hogan.

The Practical Side of Deratization with Flue-Gas, with Special Reference to the Port of Philadelphia. M. E. Berkowitz.

LXII, No. 8. Feb. 21.

The Phenomena of Infection. Victor C. Vaughn.

Hydrophobia in a Wild Philippine Monkey. Ferdinand Schmitter.

Journal of Experimental Medicine, New York.

XIX, No. 2. Feb.

Epidemiology of Poliomyelitis. S. Flexner, P. F. Clark and H. L. Amoss.

Etiology of Epidemic Poliomyelitis. H. L. Amoss.

Intraspinal Infection in Experimental Poliomyelitis. P. F. Clark and H. L. Amoss.

Journal of Infectious Diseases, Chicago.

XIV, No. 1. Jan.

Transmutation within the Streptococcus-Pneumococcus Group. E. C. Rosenow.

Rabies-Hydrophobia. J. G. Cumming.

Studies on Cultivation of Virus of Vaccinia. E. Steinhardt and R. A. Lambert.

Sanitary Significance of Body Cells in Milk. R. S. Breed.

Septic Sore Throat Epidemic in Cortland and Homer, New York. C. E. North, B. White and O. T. Avery.

Indol Production of Bacteria of the Colon-Typhoid Group. I. J. Kligler.

Comparative Tests of Sputum by Kinyoun and Elliman-Erlandren Methods. J. S. Berry and M. A. Smeaton.

Journal of Medical Research, Boston.

XXIX, No. 3. Jan.

Critical Review of Bacteriology of Human and Rat Leprosy. S. B. Wolbach and J. A. Honeil.

Differentiation of Streptococci-Preliminary Notes. C. F. Floyd and S. B. Wolbach.

Medical Record, New-York.

LXXV, No. 2. Jan. 10.

Exterpation of Bacillus Diphtheria by Means of Thallophyte Fungus, Achlya Muscaris. L. L. Ten Broeck.

LXXV, No. 4. Jan. 24.

Hygiene of Farmhouse and Farm. J. A. Nydegger.

LXXV, No. 5. Jan. 31.

Occupational Diseases. W. G. Thompson.
Beriberi. V. G. Heiser.

Public Health Reports, Washington.

XXIX, No. 5. Jan. 30.

Public Health Administration in Maryland.
Carrol Fox.

XXIX, No. 6. Feb. 6.

Report on Beriberi in the County Jail at Elizabeth, N. J. Herman B. Parker.
Relative Efficiency of Rat Traps. Victor G. Heiser.

Rural Schools. Sanitary Survey of Schools of Bartholomew County, Ind. J. A. Nydegger.

XXIX, No. 7. Feb. 13.

The Water Supply of Ships. Hugh de Valin.

XXIX, No. 8. Feb. 20.

Rocky Mountain Spotted Fever. Report for 1913. L. D. Fricks.
Examination for Hookworm Ova. Mark J. White.

FOREIGN

Annales de L'institut Pasteur, Paris.

T. XXVIII, 1. Jan.

Activation of the Tetanus Toxin. A. Marie.

British Medical Journal, London.

No. 2768. Jan. 17.

Infection of Children with Bovine Tubercle Bacillus. A. P. Mitchell.

Centralblatt fur Bakteriologie. Orig.

Erst. Abt. 72 Bd. Jan. 24.

Note on Typhoid-paratyphoid Vaccination with Mixed Vaccines. Aldo Castellani.
Healthy Coccus Carriers during Meningitis Epidemics. Y. Ustvedt and A. Diesin.
The Question of Experimental Measles. Jungleunas.

Deutsche Medizinische Wochenschrift, Berlin.

XXXIV, No. 51. Dec. 18.

Behring's Diphtheria Vaccine. K. Kissling.

XL, No. 1. Jan. 1.

Behring's Method of Vaccination against Diphtheria. B. Hahn and F. Sommer.

Gazzetta Degli Ospedali E Della Cliniche, Milan.

XXXIV, No. 147-149.

Hookworm Disease in Northern Italy. G. Cavallone.

Indian Journal of Medical Research, Calcutta.

1-3. Jan.

The Spleen Rate of London School Children. R. Ross, S. R. Christophers and E. D. Perry.

The Vitality of the Cholera Vibrio Outside the Human Body. E. D. W. Grieg.

A Note on Some Experiments Performed with a View to Finding Out the Period before Symptoms during which the Saliva of an Animal Incubating Rabies Is Infective. J. A. Cruikshank and R. E. Wright.

Journal of the Royal Sanitary Institute, London.

XXXV, No. 1. Feb.

A Pure Milk Supply. Henry Kenwood.
Diseases Carried by Insects. A. W. Bacot.
Bovine Tuberculosis: Its Diagnosis. W. P. Stableford.

Private Slaughter-Houses, Public Abattoirs and Freibanks. Herbert Peck.

Journal of State Medicine, London.

XXII, No. 2. Feb.

A Co-ordinated Tuberculosis Scheme. H. O. West.

The Influence of Underground Temperatures upon the Labor Capacity of Miners. John Cadman.

Lancet, London.

No. 4714. Jan. 3.

Prophylactic Inoculation against Pneumococcus Infection (continuation). A. E. Wright.

No. 4715. Jan. 10.

Prophylactic Inoculation against Pneumococcus Infection. A. E. Wright.
Unpolished Rice and Prevention of Beriberi. H. Fraser and A. T. Stanton.

Public Health Journal, Toronto.

V, No. 1. Jan.

Smoke Problem. R. N. Blackburn.
Municipal Food Inspection. J. G. Rutherford.
Significance of Human Waste in Modern Life and its Causes. J. S. Woodworth.

Revue D'hygiene et de Police Sanitaire, Paris.

T. XXXVI, No. 1. Jan.

Hygiene and Syphilis. E. Bodin.
The Opium Question in France and Indo-China. E. Noel Bernard.

Sanitary Record, London.

LIII, No. 1261. Jan. 16 and 30.

Kittering Sewage Disposal Works. T. R. Smith.

Sewage Disposal and Sludge Conversion. J. D. Watson.

Zentralblatt fur Innere Medizin, Leipsic.

XXXV, No. 1. Jan. 3.

The Fever after Vaccination. R. V. Jaksch.

Zeitschrift fur Hygiene und Infektionskrankheiten.

Bd. 67. 3.

Methods of Vaccination against Rabies. N. Pokschischewsky.
The Question of the Vitality of the Cholera Vibrio in Water. J. Stamm.

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A STATISTICAL STUDY OF MEASLES.

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Measles, from the time of its recognition as a distinct form of disease, has been considered relatively harmless by the great majority of the laity and by not a few of the medical profession. This belief, still shared by so many in all walks of life, is almost incredible in view of the long history and wide extent of the ravages of measles, not merely in the form of a large mortality but also in the form of non-fatal, but very numerous and serious physical impairments, directly chargeable to this disease. From the time of the Middle Ages,* at least, measles has levied a heavy toll on the populations of such civilized countries as have kept any records of the causes of death. Just what the extent of this mortality was in the early centuries can never be known, as the records are too uncertain and fragmentary for its determination. We do, however, have authentic records of great epidemics of measles in England and Scotland from the early part of the seventeenth century, and after Sydenham's description of the London epidemics of 1670 and 1674 there remains no doubt of the more or less continuous and wide havoc wrought in Great Britain and Europe by this particular form of eruptive fever. Epidemics of measles were frequent, widespread and fatal throughout the eighteenth century, and ever and increasingly so throughout the nineteenth century.

Measles is the one sickness to which we are all most susceptible, unless immunized by a previous attack and, as a corollary to this proposition, it is the one ailment from which fewest of us escape. The most reliable statistics show that from 1 to 6, or more, per cent. of all cases of measles terminate fatally. This percentage varies greatly with the circumstances of time and place, but particularly according to the age of the persons

* See "Two Hundred and Fifty Years of Smallpox in London," by William A. Guy, *Journal of the Statistical Society*, September, 1882, Vol. 45, p. 409.

attacked, the economic and social condition in which they live, and the general state of their health. The proportion of fatal cases is almost uniformly higher, for illustration, in patients of ages under one year of age, and remains high in the second and third years of life, after which the percentage of fatal cases falls rapidly, until by age fifteen it is almost negligible and remains so throughout adult life, under any but extraordinary circumstances. Again, over-crowding usually means a higher attack-rate from measles and also a higher case-fatality ratio. Close segregation of population in cities, in schools, in other institutions, in recruiting stations, in camps, or elsewhere favors the rapid spread of measles' contagion when once an affected person comes in contact with those susceptible to this morbid poison. In Glasgow, Scotland, a careful investigation revealed the fact that the attack-rate of measles among infants and young children was ten times higher in families living in one-room tenements than in families living in tenements of four or more rooms.* In Aberdeen, Scotland, statistics for the general population covering a ten-year period disclosed the fact that the case-fatality ratio of measles in that city was eight times higher in one-room tenements than in those of four or more rooms.† The experiences of Glasgow, London, and other localities where similar statistics have been compiled, yield similar results. Finally, that the health condition of the person attacked is a factor of great importance in the effect which measles produces, is evident from the unanimous opinions which have been recorded by hundreds of qualified observers.

Mortality from Measles. The most reliable international mortality statistics show that, on an average, in the countries of the temperate zones more than 1 per cent. of all the deaths are caused by measles. This statement is based upon statistics of twenty-two countries, covering the five-year period, 1906 to 1910. The percentage which measles formed of all deaths in these countries averaged, to be exact, one and one-eighth. That this is a fair average is evident from the fact that it is derived from an aggregate mortality from all causes of 32,626,651 and an aggregate of 366,262 deaths from measles. The percentage of the total mortality, chargeable to measles, varied considerably in the different countries for which the facts were available, or from 0.23 per cent. in Australasia and 0.28 per cent. in Japan, to 2.18 per cent. in Scotland, 2.14 per cent. in Belgium, and 1.98 per cent. in England and Wales. Of the twenty-two countries in the temperate zones for which the data are available, one-half showed percentages under 1.0, and one-half percentages above 1.0.

In the registration area of the United States the percentage which measles contributed to the total mortality during 1906 to 1910 was 0.71. Other

* Report of the Medical Officer of Health of the city of Glasgow, 1908, p. 99.

† Report of the Medical Officer of Health of the city of Aberdeen, 1904, p. 48.

countries with similar percentages were Switzerland, with 0.73 per cent.; Roumania, with 0.62 per cent.; Iceland, with 0.83 per cent.; and the cities of Denmark with 0.78 per cent. Other countries with relatively high percentages were Hungary, with 1.77; the Netherlands and Spain, each with 1.59; Chile, with 1.54; Austria, with 1.48, and Italy, with 1.41.

Whether or not the average contribution of measles to the total mortality is as large in the non-temperate as in the temperate zones, it is impossible to state with certainty, for the quantity and quality of the vital statistics in most of the countries of the tropical and of the frigid zones are too incomplete and unreliable to warrant a final conclusion. More or less fragmentary data, however, for certain countries, such as Cuba, Jamaica and Ceylon, and for various of the larger cities of the tropics, such as Mexico City, Mexico; Havana, Cuba; Rio de Janeiro, Brazil; Cairo and Alexandria, Egypt; Calcutta and Rangoon, India; and Manila, Philippine Islands, furnish sufficient proof that the virus of measles is capable of diffusing itself quite as readily in hot as in cool or temperate climates. So, too, the statistics of the cold temperate countries and the occasional outbreaks of measles in the Faroe Islands, Iceland and Alaska prove, conclusively, that the Arctic Circle is not a bar to the spread of measles.

From a careful study of the mortality from measles it appears to be reasonably certain that this infection is today one of the most ubiquitous with which man is afflicted. Its geographical distribution appears to be world-wide and all races and classes of men are apparently susceptible to its morbid virus.

As a partial basis for this paper, the mortality statistics, so far as they are available, have been compiled for all the principal countries of the world, for one hundred of the larger cities of the United States, and for more than fifty representative large cities located in various other countries throughout the world.* For this general comparison the death-rates have been uniformly calculated on the basis of 100,000 population of all ages. Although the more exact method would have been to calculate the death-rates with distinction of age, that method is impossible in any such wide comparison as is here attempted, for the reason that the necessary information in many cases is not available in such detail.

In the various countries of the world for which fairly reliable statistics are available for the five-year period, 1906 to 1910, the average annual death-rate from measles has varied from 48.4 per 100,000 population in Chile and 44.3 in Hungary, to 2.4 in Australasia, 3.4 in New Zealand and 6.3 in both Jamaica and Sweden. Other countries with relatively high average annual death-rates were Spain, 38.5; Scotland, 35.2; Belgium,

*A set of five charts in black and white, illustrative of the morbidity and mortality statistics of measles, may be had upon application to the author.

35.0; Austria, 33.2; Italy, 29.7; and England and Wales with a death-rate of 29.1. The average annual death-rate from measles in the registration area of the United States during 1906 to 1910 was 10.8 per 100,000 total population. The death-rate from measles in the United States was only about one-half that in the twenty-four other countries of the world combined, or 10.8 as against 20.5 for the remainder of the world for which statistics are available. It is interesting in this connection to note that in the registration area of the United States, during the twelve years from 1900 to 1911, 50,000 deaths from measles were recorded, and on the assumption that approximately the same death-rate prevailed in the non-registration area, over 100,000 deaths were caused by measles in the continental United States during the twelve-year period, 1900 to 1911.

The death-rates from measles in one hundred large cities of the United States during a twelve-year period, 1900 to 1911, show a great variation not only as between cities but from year to year in each of the respective cities. The annual death-rates from measles per 100,000 population in these one hundred cities have ranged from 85.7 in Covington, Ky., in 1901 and 85.2 in Schenectady, N. Y., in 1900, to zero one or more times in 62 cities, and 158 times altogether out of the 1,200 instances recorded in the table. The average death-rate during 1900 to 1911 for all registration cities in the registration area was 11.1 and this rate was equalled or exceeded 379 times out of the 1,200 instances tabulated; and it was exceeded one or more times in 97 of the 100 cities, the only exceptions being Portland, Me., Portland, Ore., and Spokane, Wash. Pittsburgh, Pa., had the highest average death-rate from measles during 1900 to 1911, or 26.5 per 100,000 population; and Portland, Me., had the lowest average rate, or 3.3. I may add that Pittsburgh has just experienced another epidemic, and beginning with the week ending September 7, 1912, and up to and including the week ending August 2, 1913, a period of 48 weeks, there were 10,117 cases of measles reported in that city, with 186 deaths.

The periodicity in the death-rates from measles in American cities illustrates the fairly well-known fact that in large urban centers of population almost everywhere throughout the world, measles is almost constantly present, and an epidemic generally recurs just as soon as the population under five years of age is surcharged with non-immune persons by the addition, through births, of one or two annual crops of children. Careful observations have disclosed the apparent fact that when many more than 30 per cent. of the youthful population in a densely crowded area are non-immune, an outbreak of measles is almost certain to occur. Observations extending over long periods of time and embracing wide areas have taught us that any apparent regularities in the recurrence of epidemics of measles in any given locality are probably dependent solely

on two factors, the time of importation of the morbid poison, and the number of persons susceptible to it.*

In fifty representative great cities of the world other than those in the United States, the death-rates from measles in recent years have varied even more widely than in the urban centers of this country. During the years of the period beginning with 1900 for which the statistics are available, the average annual death-rates in these cities have ranged from 147.4 in Cairo, Egypt, and 90.8 in Alexandria, Egypt, to 3.2 in Sydney, New South Wales, and 1.1 in Manila, Philippine Islands.

The mortality statistics of American and foreign cities illustrate three facts: first, that epidemics of measles are relatively numerous; second, that measles is apparently present, to some extent at least, throughout those parts of the world for which we have reliable or approximately accurate information; and, third, that there are great variations in the death-rates from measles, both geographically and historically.

The history of the many disastrous epidemics of measles in the urban centers of the world and among savage and semi-civilized tribes and peoples is one of the most interesting chapters in historical pathology. Enough has already been said of the epidemics in urban centers, but brief mention may be made of a few of the more notable epidemics of the other character. The virus of measles was imported into the Faroe Islands in 1846, and it is reported that the resulting epidemic affected three fourths of the total population. In 1874 measles was imported into the Fiji Islands, and the havoc wrought among the natives was frightful, it being reported that from one fourth to one fifth of the total population, or some 20,000 of the natives, succumbed to the disease. History records just as serious epidemics elsewhere among uncivilized peoples when the virus of measles has found them unprotected by previous attack. But we need not go far back in history to witness the effects of measles upon ignorant, superstitious peoples who have few or no qualified medical advisers. In Tutuila, one of the islands of American Samoa, an epidemic of measles occurred as recently as 1911, causing at least 219 deaths by July 23 of that year, and the mortality in some villages was reported to be nearly 10 per cent. of the total population. And yet this disease is today considered comparatively harmless by the majority of the laity in this and many other countries. The natives of the South Pacific Islands, however, have a wholesome respect for measles, which they dread more than any other quarantinable disease, not excepting even the plague, beri-beri, smallpox or yellow fever. There are many recent instances of epidemics of measles among Indians in schools, in camps, and on reservations in the United States and Canada. The disease is often quite exceptionally fatal, particularly where, as is so often true, the sanitary and hygienic conditions

* Hirsch: Handbook of Geographical and Historical Pathology, Vol. 1, p. 161.

are unsatisfactory, and a large proportion of the population attacked are in poor general health. Measles, as a rule, runs a fatal course when its victims are tuberculous, and nowhere is this better illustrated than in the detailed accounts of measles among the Indians as returned in the annual reports of the United States Commissioner of Indian Affairs and in the annual reports of the Department of Indian Affairs of Canada.

Measles and Race. Clemow, in his *Geography of Disease*, states that "all races are susceptible to it [measles], and it has been shown that it is just as capable of attacking the Chinaman, the Hindu, and the Negro as the European. It appears on the whole, however, to be decidedly less common in the African negro than in most races."* Hirsch, also, in his *Handbook of Geographical and Historical Pathology*, states that the susceptibility to the virus of measles is "uniformly shared by the whole of mankind, of whatever *races* or *nationalities*. And if," he goes on to assert "among the colored peoples, measles puts on its severest forms and leads to disastrous results exceptionally often, the reason of that does not lie in their physiological peculiarities, but mainly in the unfavorable hygienic conditions amidst which they live."†

ATTACK RATE FROM MEASLES BY COLOR AND AGE, WASHINGTON, D. C.,
1908-1912.

Ages.	White.			Colored.		
	Population.	Cases.	Attack rate per 10,000 population.	Population.	Cases.	Attack rate per 10,000 population.
Under 1. . . .	20,125	347	172.4	7,320	108	147.5
1-4.	76,680	3,392	442.4	29,220	763	261.1
5-9.	90,545	4,766	526.4	36,015	1,080	299.9
10-19.	184,410	1,252	67.9	79,395	368	46.4
20-over. . . .	805,085	671	8.3	320,375	220	6.9
All ages. . .	1,180,640†	10,428	88.3	474,705‡	2,539	53.4

The statistics of measles certainly show that all races are susceptible to this disease, but, it is doubtful if there is yet sufficient proof to warrant the assertion that all races and nationalities are equally susceptible to it. Recent statistics for various cities of this country seem to bear out the statement by Clemow that measles is "decidedly less common in the African negro than in most races." Statistics of four American cities give an average annual attack-rate from measles of 89.0 per 10,000 of white popu-

* Clemow: *The Geography of Disease*, p. 280.

† Hirsch: *Handbook of Geographical and Historical Pathology*, Vol. 1, p. 170.

* Includes population of ages not stated.

lation, as against a rate of only 41.1 for the negro, or less than one-half that for the whites.* In Washington, D. C., where the cases have been reported with distinction of color and age since April 9, 1907, the figures for the five years, 1908 to 1912, show that the attack rate was highest for the white population at all ages. These figures are so interesting that they are presented in detail in the table on page 294.

Although the attack rate seems to be lower among negroes than among the whites, there is no certainty that the death-rate is more favorable among the negroes, for the case-fatality ratio is almost invariably higher among negroes than among the whites in the same localities. In the statistics for Washington, D. C., the case-fatality ratios are shown to be higher for the negroes than for the whites at ages under one and at ages 1 to 4. The figures in detail are presented in the following table:

CASE FATALITY FROM MEASLES BY COLOR AND AGE, WASHINGTON, D. C., 1908-1912.

Ages.	White.			Colored.		
	Cases.	Deaths.	Fatality rate per 1,000 cases.	Cases.	Deaths.	Fatality rate per 1,000 cases.
Under 1. . . .	347	12	34.6	108	5	46.3
1-4.	3,392	34	10.0	763	15	19.7
5-9.	4,766	1	0.2	1,080	1	0.9
10-19.	1,252	2	1.6	368	—	—
20-over	671	2	3.0	220	—	—
All ages . .	10,428	51	4.9	2,539	21	8.3

The comparative death-rates from measles show that in some cities the negroes have experienced a higher mortality than the whites, and in other cities the reverse has been true. The facts in detail are presented in the table on page 296.

From this table it appears that the average annual death-rate from measles per 100,000 population, all ages, was higher among the negroes than among the whites in Washington, Richmond and Memphis, while in New Orleans and Savannah the average death-rates of the whites have been higher than for the colored.

In Havana, Cuba, during the five years 1904 to 1908, the white death-rate from measles was higher than for the colored every year, except 1905, and the average annual death-rate was 11.8 per 100,000 population for

*It is quite probable that the white cases are more fully reported than are the colored cases.

MORTALITY FROM MEASLES, ALL AGES, IN FIVE AMERICAN CITIES, WITH
DISTINCTION OF COLOR, 1902-1911.

(Rates per million population.)

Cities.	White.			Colored.		
	Population.	Deaths.	Rate.	Population.	Deaths.	Rate.
Washington, D. C.	2,205,182	103	46.7	922,275	60	65.1
New Orleans	2,352,420	201	85.4	856,427	38	44.4
Richmond	710,502	62	87.3	416,747	39	93.6
Savannah	297,965	12	40.1	314,805	8	25.4
Memphis	694,165	20	28.8	516,125	17	32.9
Total	6,260,234	398	64.1	3,026,379	162	53.5

the whites, against 7.9 for the colored. In Cuba, as a whole, during the four years, 1908 to 1911, the average death-rates were 4.6 for the white population and 3.3 for the colored population.

That the American Indian is highly susceptible to measles has long been attested by the frequent and often quite exceptionally fatal outbreaks of this disease among the various tribes and in various localities in the United States, Canada and elsewhere.

During the period 1888 to 1893 in an aggregate agency population in the United States of 852,679 there were 6,330 cases of measles reported by the agency physicians. This gives an average annual case or attack rate of 74.2 per 10,000 population. This rate is, so far as we are able to judge, fully as high as the average attack rate among the white urban population of this country. The corresponding death-rate among these Indians averaged 44.5 per 100,000 population, and the case-fatality ratio was 53.8 deaths to every 1,000 cases. These facts would seem to warrant the conclusion that the American Indian is quite as highly susceptible to measles as his white brother, and the history of the numerous epidemics among them is replete with instances in which a very large percentage of the total population of the tribe, or agency, have been attacked by this disease, and often with quite exceptionally disastrous results.

That the negro and the American Indian are susceptible to measles and suffer a high mortality from the disease is, therefore, quite evident, but more and better statistics are needed before the relative degree of susceptibility of these races at the various age periods can be accurately determined.

In Manila, during the period 1903 to 1912, there were 23 deaths of Filipinos officially reported as due to measles. Of this number 14 were

reported during 1912. This limited experience proves that the Filipino is by no means immune to measles. That the natives of the various South Pacific Islands are highly susceptible to measles has been proven at different times by widespread and disastrous epidemics. Reliable statistics for Japan and various cities of that empire demonstrates that the Japanese are probably quite as susceptible to measles as the Caucasian races, and what is true of the Japanese appears, from fragmentary data, to be true also of the Chinese.

Sex and Measles. It is doubtful if there is any other disease that shows less sex preference either in attack incidence or mortality-rate than does measles. Any sex differences which have thus far been revealed in the statistics of this disease seem to have been accidental rather than persistent. In the statistics for Aberdeen, Scotland, 1883 to 1902, the average annual attack rate per 1,000 of population, with distinction of sex and age, was as follows:

Age.	Males.	Females.	Age.	Males.	Females.
Under 1.....	42.2	45.4	9.....	10.9	12.5
1.....	84.2	87.6	10.....	6.4	7.1
2.....	80.9	91.1	11.....	4.2	4.6
3.....	73.2	86.1	12.....	3.4	4.7
4.....	75.6	75.2	13.....	2.5	3.4
5.....	86.7	85.9	14.....	2.2	2.9
6.....	74.3	76.2	15-24.....	1.4	1.3
7.....	44.9	49.6	25-59.....	.33	.33
8.....	20.9	20.9	60 and over.....	.07	.07

The case-fatality ratio from measles in Aberdeen, 1883-1902, by sex and with distinction of age is shown on page 298.

In Massachusetts the average annual death-rate from measles during the fifty years, 1863 to 1912, was, for males, 44.52 per 100,000 male population, ages under ten, and for females the rate was 42.75. The statistics by five-year periods, however, show that the rates were higher for females than for males during 1873 to 1877, 1883 to 1887, and 1893 to 1897. Other more or less fragmentary data seem to confirm the conclusion that measles manifests no decided sex preference, either as a disease or as a cause of death, which cannot be accounted for on grounds other than physiological differences.

Age and Measles. In the registration area of the United States during the twelve years, 1900 to 1911, only 6 per cent. of all the deaths from measles were at ages twenty and over. Nearly 82 per cent. were at ages under five; 8.4 per cent. were at ages five to nine, and 3.7 per cent. were at ages ten to nineteen. The summary of the mortality by ages is given in the table at the bottom of page 298.

**CASE FATALITY FROM MEASLES IN ABERDEEN, SCOTLAND, 1883-1902, WITH
DISTINCTION OF SEX AND AGE.**

Age.	Males.			Females.		
	Cases.	Deaths.	Deaths per 100 cases.	Cases.	Deaths.	Deaths per 100 cases.
1-3 mos.	115	13	11.3	129	6	4.7
4-6 "	358	36	10.1	307	28	9.1
7-9 "	669	100	14.9	594	86	14.5
10-12 "	417	77	18.5	445	80	18.0
Under 1 year	1,559	226	14.5	1,475	200	13.6
1 year	2,643	288	10.9	2,579	238	9.2
2 "	2,651	96	3.6	2,544	82	3.2
3 "	2,434	37	1.5	2,619	45	1.7
4 "	2,439	23	0.9	2,347	20	0.9
5 "	2,758	18	0.7	2,594	17	0.7
6 "	2,400	9	0.4	2,228	12	0.5
7 "	1,340	4	0.3	1,478	10	0.7
8 "	624	2	0.3	634	3	0.5
9 "	321	1	0.3	351	3	0.9
10 "	194	1	0.5	212	—	—
11 and over	875	4	0.5	1,025	7	0.7
All ages	20,288	709	3.5	20,086	637	3.2

**MORTALITY FROM MEASLES, WITH DISTINCTION OF AGE, UNITED STATES
REGISTRATION AREA, 1900-1911.**

Age.	Number of deaths.	Per cent. of total at specified ages.
Under 5.....	40,931	81.9
5-9.....	4,213	8.4
10-19.....	1,830	3.7
20 and over.....	3,028	6.0
Total.....	50,002	100.0

In countries or cities where measles have been long prevalent and the susceptible persons are practically limited to the infants and youths the age distribution of the deaths from measles is quite different from that in the registration area of the United States. In England and Wales, for illustration, about 93 per cent. of all the deaths from measles occur at ages under five.*

* Forty-first Annual Report of the Local Government Board, England, 1911-12, p. XXV.

Various investigations into the mortality-rate of measles by age and on the basis of population indicate that the second year of life is the age period when an attack of measles is most apt to prove fatal. The following table represents with approximate accuracy the death-rate from measles in the registration area of the United States with distinction of age:

MORTALITY FROM MEASLES, BY AGE, REGISTRATION AREA OF THE UNITED STATES, 1909-1911.

Age.	Population.†	Deaths.	Rate per 100,000 population specified age.	Age.	Population.	Deaths.	Rate per 100,000 population specified age.
Under 1.	3,956,760	4,106	103.8	20-29.	30,666,203	398	1.3
1.	3,538,256	5,498	155.4	30-39.	23,942,597	301	1.3
2.	3,880,669	2,504	64.5	40-49.	17,383,981	205	1.2
3.	3,861,646	1,222	31.6	50-59.	11,807,308	98	0.8
4.	3,785,554	737	19.5	60-69.	7,051,587	75	1.1
5-9.	17,382,981	1,464	8.4	70-over.	3,935,769	70	1.8
10-19.	32,470,097	697	2.1				
				All ages.	163,990,391‡	17,380	10.6

From these statistics it is clear that in this country the death-rate from measles is highest in the second year of life; it is comparatively high also in the first year of life, particularly in the second half; in the third year of life the death-rate is less than one-half that in the second year; in the fourth year it is only one-half that in the third; and from the fifth year of life the mortality-rate declines rapidly until by age twenty the rate is only about 1 in every 100,000 of population.

In England and Wales, during the five years, 1906 to 1910, the average death-rate from measles has been as follows by months during the first year of life as given in table on next page.

These statistics indicate that the mortality from measles in the first year of life is fully twice as high in England and Wales as in the registration area of the United States.

On the basis of survivors, the average death-rates from measles from the second to the fifth years of life in England and Wales, 1906 to 1910, were as shown in second table on page 300.

In England and Wales, as in the United States, the mortality from measles in the second year of life is fully twice as high as in the first year of life, and is more than twice as high as in the third year of life. The mortality-rate declines rapidly from the second year and in England and

† Estimated from ages of population in Continental U. S. Census of 1910.

‡ Includes population of ages not stated.

AVERAGE NUMBER OF DEATHS FROM MEASLES TO EVERY 100,000 BIRTHS,
ENGLAND AND WALES, 1906-1910.

Age.	Rate.	Age.	Rate.
Under 1 month	2.0	7th month of life	16.2
2d month of life	2.6	8th " " "	26.0
3d " " "	2.2	9th " " "	35.0
4th " " "	2.0	10th " " "	42.2
5th " " "	4.6	11th " " "	47.8
6th " " "	9.2	12th " " "	53.4

Total under one year.....243.2

AVERAGE NUMBER OF DEATHS FROM MEASLES PER 100,000 SURVIVORS,
ENGLAND AND WALES, 1906-1910.

Age.	Rate.
2d year of life	508.2
3d " " "	210.8
4th " " "	113.0
5th " " "	70.4

Wales the death-rate in the fifth year of life is less than one seventh of that in the second year. In the United States this ratio was one-eighth or the rate was 19.5 per 100,000 in the fifth as against a rate of 155.4 in the second year of life.

There is evidence to support the theory that as population becomes more and more segregated the mortality from measles is shifted from the higher to the lower ages, and particularly upon ages under three. As children become more and more segregated in schools, and as measles, in greater degree than scarlet fever or diphtheria, spreads in the home to the children of pre-school ages if it be introduced into the home by a school-attending child, there is a shifting of attack incidence and mortality to the pre-school ages.*

The case-fatality ratio of measles is highest in the second year of life, but it is almost as high in the first year. The ratio in the third year of life is less than one-third that in the second year, and in the fourth year it is only one-eighth that in the second year of life.

These statistics for Glasgow are corroborated by similar data for Aberdeen, London, and elsewhere.

* Report, Public Health Commissioner, London County Council, 1905, p. 30.

CASE FATALITY IN RELATION TO AGES, GLASGOW, SCOTLAND, 1908.†

Age.	Cases.	Deaths.	Deaths per 100 cases.
Under 1 year.....	1,575	256	16.2
1-2 years.....	2,690	509	18.9
2-3 ".....	3,334	178	5.3
3-4 ".....	3,091	76	2.4
4-5 ".....	2,956	40	1.3
5-15 ".....	8,026	56	0.7
	21,672	1,115	5.1

Before leaving the subject of age in its relation to measles it is of interest to note that measles forms an important proportion of the total mortality at ages under ten. The details for the registration area of the United States for the two years, 1910 and 1911, were as follows:

MORTALITY FROM MEASLES IN THE UNITED STATES REGISTRATION AREA,
1910-1911.

Ages.	Deaths from all causes.	Deaths from measles.	Ratio per 1,000.
Under 6 mos.....	231,501	769	3.3
6-11 mos.....	72,194	2,090	28.9
1 year.....	64,442	3,788	58.8
2 years.....	28,307	1,809	63.9
3 ".....	17,736	903	50.9
4 ".....	12,621	543	43.0
5-9 ".....	36,055	1,089	30.2
10-19 years.....	64,999	567	8.7
20-29 ".....	129,512	326	2.5
30-39 ".....	141,382	254	1.8
40-49 ".....	149,914	175	1.2
50-over.....	693,949	202	0.3
All ages.....	1,644,696	12,520	7.6

From these statistics it appears that in the third year of life 6.4 per cent. of all the deaths were caused by measles; in the second year, 5.9 per cent., and in the fourth year, 5.1 per cent., while at ages over ten the deaths from measles did not cause as much as 1 per cent. of the total mortality.

Urban vs. Rural Mortality from Measles. Other things equal, segregated populations, whether in urban centers, in armies, or elsewhere, favor the

† Report, Medical Officer of Health of the City of Glasgow, 1908. p. 96.

spread of measles and a comparatively high mortality therefrom. This fact is illustrated in a most convincing way in the mortality statistics of the registration area of the United States, where distinction is made of the urban and rural areas. The statistics are presented for the twelve-year period, 1900 to 1911, in the following table:

COMPARATIVE MORTALITY FROM MEASLES IN RURAL AND URBAN AREAS, REGISTRATION STATES, UNITED STATES, 1900-1911.

Years.	Urban.			Rural.		
	Population.	Deaths.	Rates per 100,000 population.	Population.	Deaths.	Rates per 100,000 population.
1900-1905	69,498,082	7,929	11.4	55,487,115	4,019	7.2
1906-1911	132,949,400	16,626	12.5	120,478,830	10,928	9.1
1900-1911	202,447,482	24,555	12.1	175,965,945	14,947	8.5

From these data it is shown that in the registration urban area of the United States the average mortality from measles during the twelve years was 12.1 per 100,000 of population, all ages, against an average rate of 8.5 for the registration rural area. The average urban death-rate from measles was, therefore, 42.5 per cent. higher than the average rural death-rate. The different age distribution of the population in the city and country districts would affect these mortality rates somewhat but in a way to increase rather than diminish the difference in favor of the country. The percentage of the total urban population at ages under ten was only 18.8 in 1910, as against 25.1 for the rural population, and as measles is preëminently a disease of infancy and early youth, other things equal, we would expect a higher attack incidence and mortality from this disease in the country districts than in the urban areas. The facts show that segregation of population in the cities of the United States, as elsewhere throughout the world, is one of the most important factors favoring the diffusion of measles.*

The following statistics seem to indicate that in this country, as is also probably the fact elsewhere throughout the world, the proportion of the total deaths from measles which falls upon children under ten is considerably higher in the large cities than in the small cities and rural districts.

* For English conditions, see Thirty-ninth Annual Report of the Local Government Board, 1909-10, App. X, A., No. 1, pp. 1-2, Report of Medical Officer.

MORTALITY FROM MEASLES IN THE REGISTRATION STATES OF THE UNITED STATES, 1909.

Ages.	Registration states.		Cities with over 100,000 population.		Remainder of registration states.	
	Number of deaths.	Per cent. distribution by age.	Number of deaths.	Per cent. distribution by age.	Number of deaths.	Per cent. distribution by age.
Under 5 . . .	3,791	85.7	1,783	92.8	2,008	80.3
5-9	334	7.6	103	5.4	231	9.2
Under 10 . . .	4,125	93.3	1,886	98.2	2,239	89.5
All ages . .	4,423	100.0	1,922	100.0	2,501	100.0

These statistics show very clearly that as our population becomes more and more segregated in cities there is a shifting of the mortality from measles from the higher to the lower ages. This is due primarily to two factors, first, the greater liability in urban centers to attack from measles at an early age, and, second, the universally higher case-fatality from this disease at the early ages. These are probably the more powerful factors which coöperate to bring about the comparatively high proportion in cities of the total deaths from measles which occur at ages under five and under ten, but there are other contributory factors, such as housing, overcrowding, and other socio-economic conditions which are apt to press harder in the cities than in villages and rural districts.

The medical experience of our Civil War is replete with proof that a large proportion of the rural population at that time attained to adult ages without having had measles. Frequently the majority of the soldiers in a regiment raised in the rural districts would be attacked by measles, the exempt often being only those who had had a previous attack.* Many of the companies recruited from the rural districts, both Union and Confederate, were so seriously crippled by measles that temporary disbandment was found necessary. This drastic action was seldom, if ever, resorted to in companies or regiments recruited from cities.

What was true at the time of the Civil War is still true, but not to the same extent, for measles is now more widely diffused, even in the rural districts, than in the fifties † and sixties of the nineteenth century. In

* Outlines of the Chief Camp Diseases of the U. S. Armies; by Joseph J. Woodward, M. D., Philadelphia, 1863; pp. 268, 277. Also, U. S. Sanitary Commission Memoirs; edited by Austin Flint, M. D., New York, 1867; pp. 13, 219, 228, 230, 231.

† Diseases of the Interior Valley of North America, by Daniel Drake, M. D., Philadelphia, 1854, Vol. II, p. 586.

1911, for illustration, a serious outbreak of measles occurred among the United States troops stationed at Columbus Barracks, resulting in 1,101 cases and 25 deaths.* "Epidemics of this character still occur frequently at the large recruiting depots."†

Season and Measles. The statistics of the morbidity and mortality of measles show that, as a general rule, cases increase in number with the beginning of the cold season. This may or may not be due directly to temperature change, but a more plausible explanation would seem to be that, with the beginning of the colder season, children are more closely segregated in schools; ventilation is generally less adequate and other factors more or less dependent upon cold weather react to bring about more sick cases and more deaths from measles than occur in the summer months.

A careful study of the recorded cases of measles and the reported deaths from the same in New York City and Philadelphia by weeks for a seven-year period (1906-12) disclosed the fact that as the actual number of cases decrease the case fatality-ratio increases. This phenomenon was corroborated by the combined returns by weeks for fourteen large American cities during 1912, and it was also noted by Dr. Wilson when he made his investigation of the statistics of measles in Aberdeen, Scotland, during the twenty years, 1883 to 1902.

I am unable to do more than offer some suggestions as to why this is so. Possibly the cases are not so fully reported during the vacation period as during the school year; possibly the deaths, or a fair proportion of them, refer back to cases reported some weeks earlier; and possibly the higher case fatality is due to reduced general vitality coincident with the hot summer months. This latter explanation is in part confirmed by the industrial experience of The Prudential. An analysis of the primary complications in 190 fatal cases of measles which occurred in the months of July, August and September, showed that 9.5 per cent. of the total were digestive, against 1.9 per cent. during the other nine months of the year. On the other hand, during July, August and September, 65.3 per cent. of the total primary complications were of a respiratory character, against 80.7 per cent. during the other nine months of the year.

Increase or Decrease in Mortality from Measles. The question whether or not there has been a decrease in the mortality from measles admits of reasonable doubt. The crude death-rates for the various countries of the world show in most cases a decline, but when correction is made for age, this apparent decline is often almost, if not completely, offset by the decline in the birth-rate. In other words, in countries where the birth-rate is steadily declining, the proportion of the total population of ages under five steadily diminishes also, and it is at ages under five that this disease is most fatal.

* Report of the Surgeon-General, U. S. A., Washington, D. C., 1912, pp. 78, 79.

† Report of the Surgeon-General, U. S. A., Washington, D. C., 1911, p. 72.

In the registration area of the United States there has been an increase in the crude death-rate from measles, if comparison is made of the two six-year periods, 1900 to 1905, and 1906, to 1911, as the following summary statistics show:

MORTALITY FROM MEASLES IN THE REGISTRATION AREA OF THE UNITED STATES, 1900-1911.

(Rates per million population, all ages.)

Registration area.	1900-1905.			1906-1911.		
	Population.	Deaths.	Rate.	Population.	Deaths.	Rate.
Urban.....	69,498,082	7,929	11.4	132,949,400	16,626	12.5
Rural.....	55,487,115	4,019	7.2	120,478,830	10,928	9.1
Total.....	124,985,197	11,948	9.6	253,428,230	27,554	10.9

In the urban portion of the registration area the mortality from measles has increased from 11.5 during 1900 to 1905 to 12.5 during 1906 to 1911, or 8.7 per cent.; the rural rate has increased from 7.2 to 9.2, or 27.8 per cent.; and the rate for the whole registration area has increased from 9.6 to 10.9 or 13.5 per cent. In the United States, therefore, it is quite probable that the death-rate from measles, if it could be calculated on the basis of population and deaths under five years of age, would show a much larger increase, for there is no question that the birth-rate has declined appreciably in this country in recent years.

In the state of Massachusetts it has been possible to calculate the death-rate from measles at ages under ten for a fifty-year period, 1863 to 1912, and the comparison of the average rates in the first and last decades of the period is presented in the table at the top of page 306, together with similar rates from scarlet fever, whooping-cough and diphtheria.

In Massachusetts there seems to have been a decline in the average death-rate from measles at ages under ten from 6.74 per 10,000 population of these ages during 1863 to 1872 to 3.43 during 1903 to 1912, or 49.1 per cent. The mortality in Massachusetts from measles at ages under ten by five-year periods is presented for a fifty-year period in the second table on page 306.

These statistics show that even in Massachusetts the mortality from measles has remained fairly constant since 1872, the average rate during 1908 to 1912 being very little lower than during 1873 to 1877. The quinquennial rates varied during the fifty years from 7.8 in 1868 to 1872 to 3.1 during 1893 to 1897.

COMPARATIVE MORTALITY FROM MEASLES, SCARLET FEVER, WHOOPING-COUGH, AND DIPHTHERIA AND CROUP, MASSACHUSETTS, 1863-1872, AND 1903-1912.

(Rates per 10,000 population, ages under ten.)

Causes of death.	1863-1872.		1903-1912.		Per cent. decrease.
	Number of deaths, ages under 10.	Rate.	Number of deaths, ages under 10.	Rate.	
Measles.....	1,986	6.74	2,017	3.43	49.1
Scarlet Fever.....	9,641	32.75	1,999	3.40	89.6
Whooping Cough.....	2,949	10.02	2,824	4.80	52.1
Diphtheria and Croup ..	9,291	21.56	6,127	10.41	67.0

Population, Ages under Ten: 1863-1872—2,943,520
1903-1912—5,884,654

MORTALITY FROM MEASLES, AGES UNDER TEN, MASSACHUSETTS, 1863-1912.

(Rates per 10,000 population, ages under ten.)

Period.	Population.	Number of deaths.	Rate per 10,000.
1863-1867.....	1,406,227	785	5.6
1868-1872.....	1,537,293	1,201	7.8
1873-1877.....	1,677,862	679	4.0
1878-1882.....	1,752,137	776	4.4
1883-1887.....	1,818,939	1,177	6.5
1888-1892.....	2,009,421	762	3.8
1893-1897.....	2,309,685	717	3.1
1898-1902.....	2,648,036	1,074	4.1
1903-1907.....	2,765,993	889	3.2
1908-1912.....	3,118,661	1,128	3.6

On the other hand, in several large cities of this country there seems to have been a very material reduction in the death-rate from measles during the last thirty years and a summary statistical statement is herewith presented of the mortality in ten cities for which the information is available by age. For the sake of brevity and because 92.1 per cent. of all the deaths from measles in these ten cities occurred at ages under five, this comparison is limited to that age period.

COMPARATIVE DEATH-RATES FROM MEASLES, IN TEN AMERICAN CITIES.

(The average annual death-rates per 10,000 population, ages under five, for 1883-1887, compared with the average rates for 1908-1912.)

Cities.	Death-rates per 10,000 population.		Change in rate.	
	1883-1887.	1908-1912.	Actual.	Per cent.
Boston.....	20.1	14.9	- 3.2	-25.9
Cleveland.....	14.9	6.9	- 8.0	-53.7
New Haven.....	18.4	8.5	- 9.9	-53.8
New York City.....	45.6	15.1	-30.5	-66.9
Philadelphia.....	13.0	11.4	- 1.6	-12.3
Providence.....	21.7	21.6	- 0.1	- 0.5
Reading.....	28.5	2.7	-25.8	-90.5
St. Louis.....	6.6	9.1	+ 2.5	+37.9
San Francisco.....	8.4	9.2	+ 0.8	+ 9.5
Washington, D. C.....	18.7	3.9	-14.8	-79.1
Total.....	25.7	13.0	-12.7	-49.4

These statistics indicate that the mortality from measles has diminished considerably in certain cities during the last thirty years. In Providence, however, no appreciable change has taken place, and in *St. Louis* and *San Francisco* the rates have actually increased. The improvement in the rate has been most marked in Reading, Pa., where the death-rate from measles at ages under five decreased from 28.5 in 1883 to 1887 to 2.7 in 1908 to 1912, or 90.5 per cent. These facts are significant for they seem to prove that the mortality from measles can be materially reduced when efforts are wisely directed, and proper coöperation of health authorities, school authorities and the public generally is secured and a campaign of education is carried on with energy and persistence.

Control of Measles. Measles and whooping-cough are probably today, of all the widely diffused diseases, the least amenable to sanitary control. At any rate, these two infectious diseases have thus far been less subjected to control than any other of the equally important diseases of this class with which humanity is afflicted. In the case of measles there are several reasons to account for its being difficult to control. Among the more important of these are:

First. Incomplete knowledge of the identity and nature of its virus.

Second. The fact that it has an infectivity period of forty-eight hours or more previous to its eruptive appearance in an infected individual.

Third. The curious fact that it has always and almost everywhere been considered a mild and comparatively harmless disease by a large proportion of the population.

Fourth. Because it is so widely diffused, so highly contagious and so largely a disease of infancy and early youth.

Much remains to be learned of the character of the virus of measles, but the recent researches of Anderson and Goldberg indicate that even this morbid poison can be subjected to critical analysis which will yield valuable results. If, for illustration, it can be demonstrated conclusively that measles can be conveyed only by direct contact it will mean a tremendous saving of school attendance, for in that event a child of school age, immune by previous attack, need not be excluded from school when its brothers, sisters or other members of the family are ill with this disease.* If complete statistics could be had of school exclusions now required of children immune to measles, this statement would be greatly strengthened.

More statistics are needed to determine the infectivity period of measles. A most excellent recent study of this kind, based upon practical experience, has been made by Dr. E. C. Levy, health officer of Richmond, Va. His conclusion, based upon observations made during the Richmond epidemics of 1910 and 1912, seems to confirm absolutely those of other observers, namely, that measles is highly infectious at least four days previous to the appearance of the eruptive rash. This conclusion has also been confirmed by the Anderson and Goldberg laboratory investigations. This fact makes it highly important that known cases of measles be notified at the earliest possible moment in order that exposed susceptible persons may be isolated until it is definitely determined whether or not they have caught the disease. This follow-up method has been more effective than any other effort yet made to minimize the number of cases and also to minimize the mortality from existing cases.

Authorities have in the past been in disagreement as to the benefits of compulsory notification of measles but those opposed to notification have been so because of practical difficulties in the form of expense, lack of sufficiently large health department staffs, lack of hospital accommodation for isolation of patients, etc. Presumably, however, there is quite general agreement that notification of cases of measles must be a preliminary requirement, and a necessary part of any complete program for the better control of measles. The best modern practice seems to be that whereby coöperation is effected between parents, school teachers, medical inspectors of schools, visiting nurses and health departments. When such coöperation can be brought about the control of measles is very greatly facilitated by making it possible for the health authorities to get early information of the appearance of the disease in any given community.

* A new regulation of the Department of Health of New York City (1913) provides that children, and other members of the family who have had measles, may continue in school provided that quarantine at home is properly observed.

Having this early knowledge of the appearance of the disease, steps can at once be taken to guard against its spread by special instruction to the parents, by exclusion from schools of non-immune children who are suspected of having been infected, through warning notices to teachers, etc. In addition, and quite as important, it is possible for the health department to emphasize the necessity that the patient sick with measles shall get proper care and treatment, by pointing out to the parents the dangerous character of the disease due to its frequent and fatal complications and many serious after-effects.

The follow-up method has been found to be particularly effective by reason of the much-needed educational work which can thus be done where most urgently required, that is, at the points of infection. Not only can the ignorance of parents be largely overcome, but their interest can be aroused by emphasizing the grave danger of measles when proper safeguards are not thrown about the patient. One of the most serious obstacles in the way of sanitary control of measles is the indifference to it so widely manifest almost everywhere. This indifference is not only prevalent among the laity but it is frequently met with among the medical fraternity. In 1910 a health officer of a large city in this country made the following astonishing statement:

"There were no deaths from this disease and there were but a few cases. In this climate this disease seldom assumes a malignant form and probably strong, healthy children, under careful control, would do well to contract the disease to escape the malignancy of the disease in adult age." *

This misinformation is of a kind with that put forth in a popular way by a widely read physician-author, who, in a book entitled "Preventable Diseases," makes the amazing assertion that "Fortunately neither scarlet fever *nor measles* usually becomes acutely infectious until the rash appears." † Surely when doctors fail to realize the significance of the well-known facts relating to measles we cannot hope to accomplish the best preventive results without a vigorous and continuous campaign of education as a necessary accompaniment of any and all other measures.

* Reports of the City Officers of the City of Savannah, Ga., 1910, p. 215.

† "Preventable Diseases," by Woods Hutchinson, A. M., M. D., Houghton Mifflin Co., 1909, p. 257.

THE RESULT OF THE EXPERIMENTAL EMPLOYMENT OF HYPOCHLORITE TREATMENT TO A PORTION OF THE CHICAGO CITY WATER SUPPLY.

G. B. YOUNG,

Health Commissioner, Chicago, Illinois.

Read before the Section of Public Health Officials, American Public Health Association, Colorado Springs,
September, 1913.

There are a good many communities in which there is a firmly held belief that whatever else is wrong their water supply is all right, or at least cannot be held responsible for any of the typhoid which may occur. The following notes are written as a warning to such communities that, while they may be justified in thinking their water supplies better than the average, they are not justified in asserting that with them water-borne typhoid is a negligible factor.

The rapid and progressive decline in the typhoid death-rate in Chicago during the years that have elapsed since the opening of the drainage canal permitted the progressive diversion from the lake of the city's sewage, a decline from 19.8 in 1900 to 10.8 in 1911, led to the general assumption that water-borne typhoid in Chicago had ceased to be of any moment.

The cribs supplying the southern part of the city were known to be occasionally subject to pollution from the Calumet River (see map), but as this pollution was considered to be dependent upon the direction of the wind and even then only important at times of flood, as in the early spring, and as the rate had rapidly declined in the southern quarter as well as elsewhere in the city, no particular importance was attributed to the matter.

The very great improvement in the milk supply and in general sanitary conditions was so unquestionably responsible for much of the decline in the typhoid rate that for several years practically no attention was given to the water as a persisting factor in the situation.

Roughly speaking, the water supply map of Chicago may be divided into four districts, as indicated on the accompanying map. There is a certain amount of mixing of water along the borders of the districts, but substantially the water supplied to each district is distinctly separate.

This made possible a study of the comparative incidence of typhoid in the various districts that strengthened the opinion of the writer that too little attention had been given to water-borne typhoid.

Even when allowance had been made for the differences in population in the various districts and for the occurrence in 1911 of a localized milk-borne (carrier) outbreak, the typhoid incidence in the southern districts was disproportionately large.

Undoubtedly there is more vacation typhoid in the first of these districts than in the third, but probably no more, if as much, as in the fourth, so it was clear that some factor was present in the first district that was either absent in the other three or at least of less importance.

The fact that the so-called Hyde Park district did not contain the most congested portions of the city made the figures all the more striking.

Early in the spring of 1912 arrangements were made by the Department of Public Works to try the effect of using hypochlorite at the cribs supplying the southern district.

There was some disposition on the part of the Finance Committee of the City Council to hesitate in authorizing the necessary expenditure because of fear that the hypochlorite might be tasted and the discovery of its use give rise to unfounded distrust of the general water supply.

Samples of treated and untreated water were, therefore, supplied for the consumption of the sub-committee in charge of the matter. The members could not tell one from the other, and decided to approve the experiment.

The introduction of the hypochlorite was begun at the Dunne crib on March 15, 1912, and at the Hyde Park crib on July 16, 1912, and, on account of the freezing of the solution in the temporary wooden tanks, was discontinued December 12, 1912.

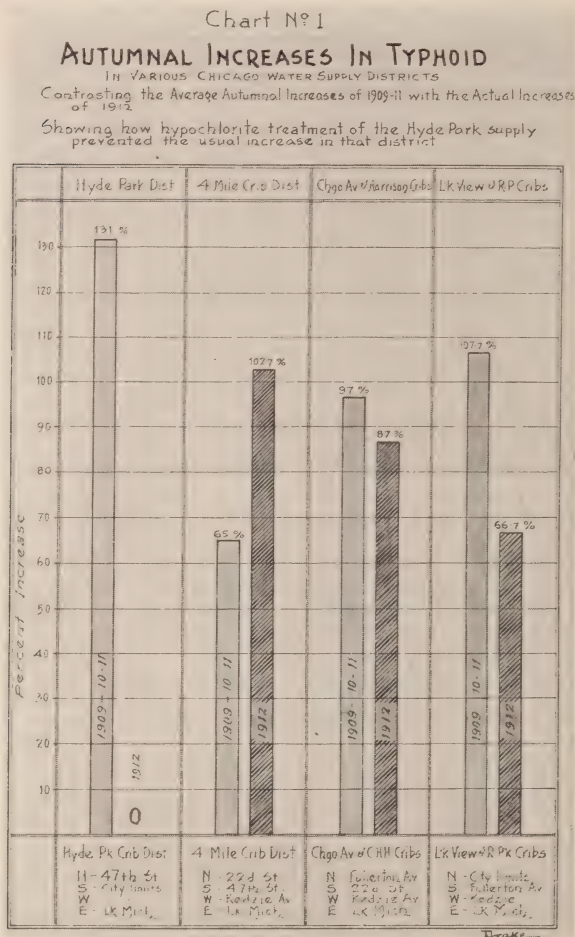
The year 1912 was one of those known as "a good typhoid year," that is, a year in which the typhoid incidence was low in the country generally. Chicago was no exception, but a consideration of the following facts will show that the reduction in that city was due to something more than a seasonal factor.

The average increase of typhoid during the autumnal months of 1909-10-11 was as follows, by "autumnal increase" being meant the total increase for July—November inclusive, over February—June inclusive:

District.	Percent of autumnal increase— Av. 1909-10-11.
Dunne and 68th Street.....	131
4-Mile.....	65
Chicago Avenue.....	97
Lake View.....	107.7
Average increase for city.....	100.1

In 1912 one district, the 4-Mile crib or 14th Street district, showed a marked rise in the autumnal increase as compared with the average for the three previous years, viz., 102.7 per cent. increase in 1912 against 65 per cent., but the average increase for the three *untreated* districts as shown below was 14.7 per cent. less than the average for the whole city for the three previous years:

District.	Percent of autumnal increase— 1912.
14th Street.....	102.7
Chicago Avenue.....	87
Lake View.....	66.7
Average for untreated districts.....	85.4



When, however, the figures for the district supplied with treated water are included we get a very different and a very significant result:

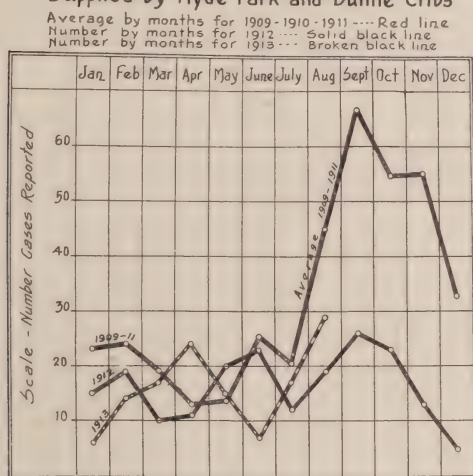
District.	Percent of autumnal increase— 1912.
Dunne and 68th Street.....	0
4-Mile crib.....	102.7
Chicago Avenue.....	87
Lake View.....	66.7
Average for entire city.....	64.1

The two accompanying charts tell the story very plainly. No. 1 shows the average autumnal increase for each of the four districts for the years 1909-10-11, contrasted with the increases in the same districts for 1912. I do not see how any one studying this sheet can escape the conviction that water-borne typhoid in Chicago must still be reckoned with as a factor of considerable importance in determining the city's rate.

Chart No. 2 shows the curve for cases of typhoid fever in the Hyde Park (Dunne-68th Street cribs), (a) for the average for 1909-10-11; (b) for 1912; (c) for 1913.

In 1912 the death-rate for typhoid in Chicago was 7.5 per 100,000 as

Chart No 2
Cases of Typhoid Reported in Districts of Chicago
Supplied by Hyde Park and Dunne Cribs



Hypochlorite treatment established at - Dunne Crib - March 15, 1912

" " " " Hyde Pk Crib - July 16, 1912

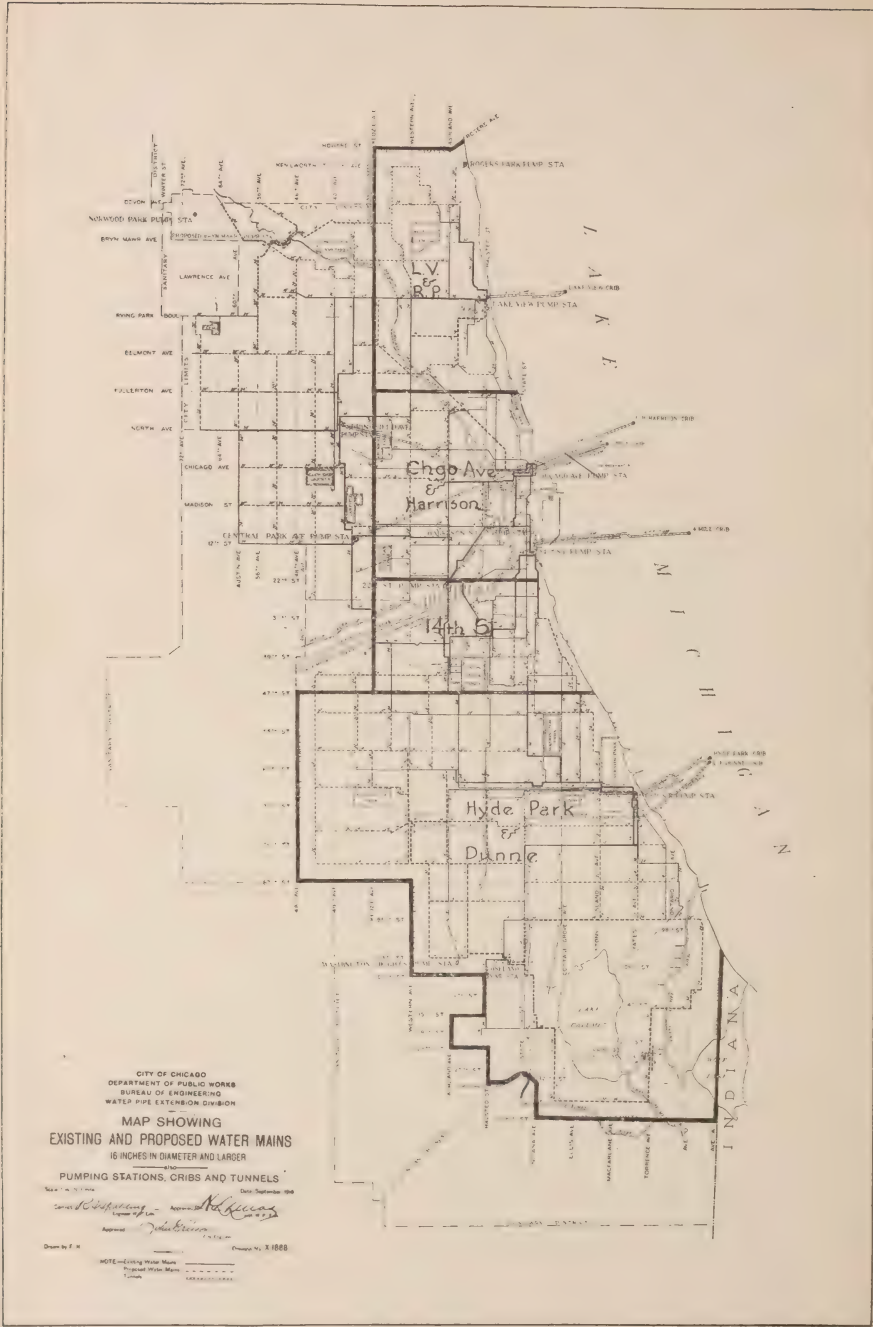
Interruptions at - Hyde Pk Crib - Dec 15, 1912 to Apr 15, 1913 (freezing)

" " " " June 2, to June 18, 1913 (new tanks)

" " " " Dunne Crib - Dec 15, 1912 to June 27, 1913

against 10.8 for 1911, a reduction of 30.5 per cent. Many factors played a part, no doubt, in this reduction, but the figures and charts given in this paper show conclusively that the hypochlorite treatment was a large factor.

A word of explanation of the 1913 curve in Chart No. 2: The use of the hypochlorite was suspended December 15, 1912, as already explained. As soon as weather permitted, the temporary wooden tanks were replaced by concrete, but time had to be given for these to cure, and there were other delays so that the treatment was not resumed at the 68th Street crib until April 15, and at the Dunne crib until June 27, 1913. Moreover, it was suspended at the 68th Street crib from June 2 to 18 to permit the installation of a new mixing tank.

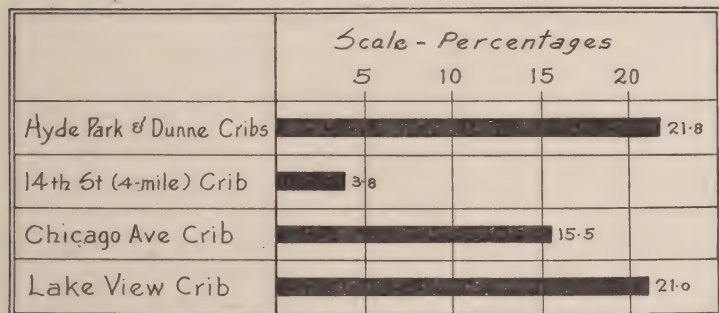


It is interesting to note how the curve for 1913 was climbing the first three and a half months of 1913, and how sharply it declined for the two months after the 15th of April.

A study of the colon findings for 1912 in the untreated water of all four districts gave the result shown in Chart No. 3.

The Chicago Avenue district is probably the most important in the city from a typhoid standpoint because it embraces congested sections wherein the occurrence of one case is more apt to be followed by contact infection, but the present arrangement of the water tunnels made it impossible to use hypochlorite effectively. The first extension of the system was, there-

Chart No 3
Coli Findings in Chicago's Water Supply
Percent of Positive Findings



fore, procured for Lake View, and the treatment was begun there on the 15th of August, 1913.

The new Lake View pumping station is about complete, and this will do away with the use of the Rogers Park intake (see map) so that approximately 32 per cent. of the population will be getting treated water.

Of course, the figures given are based on cases reported and not on deaths, and so are open to some criticism, but as the deaths reported bear a normal relation to the cases, the objection is more apparent than real.

The reason for using cases instead of deaths is that we had no tabulation available for the deaths by wards for the years prior to 1912.

MARRIAGE REGISTRATION: ONE WAY OUT.

W. J. V. DEACON,

State Registrar of Vital Statistics, Topeka, Kan.

Read before the Section on Vital Statistics, American Public Health Association, Colorado Springs, September, 1913.

Marriage presents two important elements, one legal and one social,—it is both a legal contract and a status.

By entering into a marriage contract the parties thereto, in addition to assuming rights and liabilities toward each other, assume a new relation toward society in general.

The term marriage has been defined as "the act of marrying or uniting a man and woman as husband and wife; the legal union of a man and woman for life; the state or condition of being married, wedlock." Herbert Spencer in his *Principles of Sociology* says: "The martial condition has gradually evolved," and that the first stage was promiscuity, joined with indefinite polygamy, and in due time was evolved monogomy, the natural form of sexual relation for the human race.

Because of the great legal importance of the marriage contract, because of its immense importance to society, and because it is one of the vital elements of human life, and the fundamental event in the establishment of the recognized basis of civilization and of law and order—the family—it is because of all of these things that the law undertakes to regulate the marriage contract more closely than any other form of contract.

The Census Bureau defines vital statistics as the statistics of births, stillbirths, deaths, marriages, divorces and sickness. It further states that effective registration of marriages and divorces is quite different from the effective registration of births and deaths.

I believe it is generally conceded by all officials that the registration of marriages is a very proper function of the vital statistics department, and that it will not be necessary for me to present any argument to this end.

I presume there is no state but what has maintained, at least in some degree, a form of marriage registration. In Kansas, prior to this year, it has been the custom to issue a marriage license through the probate court of each county, the form of such license and the method of its issue and the regulations and conditions to be fulfilled being defined by statute. In Kansas there are 105 counties, some of them of scarcely more than 1,000 population, the largest being approximately 100,000. The license issued by the probate court was required to be endorsed by the person performing the marriage ceremony and was returned to the probate judge for record. In many of these counties the records were beautifully kept,

fully indexed, and to find the record of any marriage occurring within the history of the county was a matter of only such time as might be required to study through the index of from one to one hundred different books. In other counties the records were very loosely kept; many of them were lost through fire or carelessness, and in general the records were in a more or less chaotic condition.

Another feature that was perhaps more significant than any other was the fact that a marriage license might be issued by any probate judge in the state regardless of the residence of the contracting parties, and when so issued the marriage might be performed by any one authorized by law to perform the marriage ceremony in the state regardless of the residence of the contracting parties or the place of issue of the license. The result was that in order to find the record of a marriage that occurred "somewhere in Kansas," and all registration officials will recognize that this is frequently the best information obtainable, it would be necessary to seek through the records of 105 counties, and if the record was an old one, with many opportunities for it having been lost or so poorly indexed as not to be found.

As an illustration of the difficulty in tracing these matters, I would cite an instance that came to my attention where the groom was a resident of Denver, Col., the prospective bride was a resident of Marshall County, Kansas; the groom passed through Topeka on his way to the bride's home and as he changed cars there and had a few hours of leisure he improved it by securing a marriage license in Shawnee County. The marriage was duly performed at the bride's home and the marriage is now of record in Shawnee County, one hundred miles from the home of the bride and in a county where she had never been. It is hard to conceive under what conditions prospective heirs or others interested a generation from now, who might be required to prove this marriage, would think of looking in the records of Shawnee County for their information. This is only one of many hundreds of instances that might be recited; but to sum up the point which I desire to make was the necessity for a centralized record.

In 1911 the legislature passed a bill that in its provisions was quite similar to the model vital statistics law. For six years, and through three legislatures, this bill had been before the state, and for the two years immediately preceding its passage the state board of health conducted an active campaign of education in its behalf. The success of that campaign may be imagined when I tell you that there were but two votes against the bill on final passage. However, after the bill had passed we went before the Ways and Means Committee to ask for money for the maintenance of the Central Division of Vital Statistics and estimated that the least amount we could do with would be \$5,000 per year the first biennium, but asked for \$6,000. It is not necessary for me to recite the

story of the battle which followed, bloodless to be sure, but it ended in our securing an appropriation for the biennium of \$2,500 a year. Had it not been that we were able to divert other funds of the state board of health to the work, the enforcement of the vital statistics law would have been an impossibility. With the advent of the legislature of 1913, representing a sharp political change and elected on an economy platform, it became apparent that we could not expect an increase in our previous appropriation, and further that the other funds of the department would be so deeply cut that we could not secure the aid which we had the previous biennium. I had been working tentatively on the preparation of a bill providing for the centralization of the marriage records, but fearing that we could not secure sufficient help in the office to carry on the work, thought best not to have the bill introduced; but when it became apparent that it was the purpose of the legislature to greatly reduce, if not entirely cut out the appropriation for vital statistics work I conceived the idea of creating a revenue from the marriage registration that would enable us to carry on the work of the department.

The only records which the department had available of the number of marriages were records secured during 1907 and 1908 by the assessors, and these records showed approximately 10,000 marriages for 1907 and about 9,500 for 1908. We, therefore, fixed the fee at 50 cents and provided that said fee should be in addition to the other fees required, and that the entire amount thus collected was to be used for the maintenance of the Central Division of Vital Statistics. We used the argument that this was a tax that came upon a man in the ordinary course of events but once in a life time, and came at a time when most people at least were willing to pay it.

We left no stones unturned to secure the passage of this act, which was done without material amendment and is now in force, becoming effective about May 1, upon the publication of the statute book. The revenue derived therefrom, up to the close of August, a period of four months, has amounted to \$2,652.50, a rate of about \$8,000 per year, and while it is not as much as we would like to have by any means, is somewhat more liberal than we could expect from legislative appropriation, and we are enabled to do at least a fair portion of the work which should be done.

Believing that the Kansas legislature is not materially different from the legislatures of other states in the matter of appropriations, particularly for work in the line of sanitation or preventive medicine, or any other work from which the people as a whole derive the benefit, I am giving you this little paper describing "One Way Out" in the hope that it may suggest to some of you a means of securing the necessary financial aid to carry on the work of vital statistics.

The law is working quite smoothly, the probate courts getting in their reports promptly, and it is rare that any serious question arises.

Considerable protest was raised when the law first became operative because the probate judge did not receive the license back and the county had no record as to whether or not the marriage ceremony was ever performed. To obviate this difficulty we report back to the probate judge each month the numbers of those licenses which have not been returned.

The original license bearing the endorsement of the person performing the ceremony is filed as the record, after being card-indexed under the name of each of the contracting parties.

The registration of marriages being a proper function for the state, we have by this law accomplished the dual result of providing for a centralized registration and freed the entire Central Division of Vital Statistics from dependence on legislative appropriation.

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POLITICS AS A FACTOR IN RETARDING PUBLIC HEALTH PROGRESS.

It is refreshing to observe in the advertisement contained elsewhere in this issue of the JOURNAL the notice of an examination for an important position in the public health service of a southern city in which it is officially stated that the successful candidate will be appointed for three years and "beyond political interference." This is a sign of the times and a right welcome one. The divorcement of politics and public health proceeds apace but is far from complete. One of the serious barriers that restrains persons

from entering the public health field as a profession, exists, in our opinion, in the evident inability to guarantee positions for efficient public health servants which will be devoid of political preferences and interferences. Dr. Hodgetts, of Ottawa, writing over two years ago in this JOURNAL tersely stated that "men should not be placed in prominent health offices unless qualified, for men are not born sanitarians, nor can they be hatched out in a night at party caucus." As time goes on more men and women are training themselves for a life-work in the public health service. Many hesitate in so doing, largely on account of the all too frequent examples of public health officials being peremptorily removed from office with over-turns in state or city government.

In the days when the health department's chief occupations consisted of the inspection of nuisances and the placarding of houses, no high degree of knowledge or scientific attainment was necessary, and frequent changes made little difference in a system already recognized as being bad. Today, the health officer should be more than a sanitary patrolman; he should be so trained that he may be capable of intelligently studying preventable diseases in order to ferret out information which will possibly enable him to trace to their sources. His failures to do this will be many, but the benefits derived from occasional successes may bring advantages of a great magnitude to the community. The health officer of today must be an educator and capable in publicity work. With the recognition of the significance of contact infection, and with the increasing testimony of the prevalence of germ carriers, it is becoming more and more essential that the public be adequately informed that much of the existing communicable disease arises from such sources and that water purification, milk pasteurization, and similar preventive measures will not in themselves give him more than a partial protection. The modern health officer needs to be a sociologist or at least sociologically inclined. The interrelation of preventable diseases with poverty, unemployment, underemployment, etc., are real, even if oftentimes subtle and insidious. Without enumerating all the desirable characteristics of a successful public health worker, we may finally add that the health officer should possess a personality, which combines tact with fearlessness, and commands the respect of the people. The requirements for the ideal are not easy to fill and the political uncertainties, to an extent perhaps larger than is generally recognized, are responsible in deterring many potential public health workers from entering the field. Separation of the public health work of our communities from the sphere of political spoilage is to be ardently advocated and worked for.

There are few more valuable services to be performed than the stimulation of communities to demand that the public health service be accorded a "hands off" policy by local politicians.

THE ANTIRABIC SERVICE OF THE HYGIENIC LABORATORY FOR THE PAST FIVE YEARS.

JOHN F. ANDERSON,

Director Hygienic Laboratory, Washington, D. C.

Read before the Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

On April 28, 1908, the antirabic service of the Hygienic Laboratory in Washington, D. C., was inaugurated. As the facilities of this branch of the Public Health Service have been made use of to so much advantage by state boards of health, I thought it might not be untimely to sketch in brief some of the work and the results obtained from the use of the virus both by the Hygienic Laboratory and by state board of health laboratories for the period between April 28, 1908, and July 1, 1913, or slightly over five years' time.

Prior to 1908, it has been the general belief that antirabic virus could not be properly administered unless the individual needing treatment went to a Pasteur institute. This often entailed travel for long distances and consequent delay in beginning the treatment. Many persons exposed to infection were not able to secure treatment on account of the exorbitant charges made at some of the institutes. Previous to August, 1908, when the Hygienic Laboratory began the distribution of antirabic virus by mail to state boards of health, a small amount of glycerinated virus was sold by the New York City health department and sent short distances; but the practicability of distributing the virus through mails was not generally appreciated. Since that time the practicability of shipping virus for use at distant points has been demonstrated in many places.

The virus, as distributed by the Hygienic Laboratory, consists of portions of the dried, glycerinated cord; in no instance is the emulsion sent. As the preparation of the emulsion from the glycerinated cord requires a considerable amount of technical skill, it is insisted that the treatment shall be administered under the supervision of the state health authorities; the virus in no case is furnished to private physicians.

From August, 1908, to July 1, 1913, 4,200 complete treatments of antirabic virus have been distributed by the Hygienic Laboratory, as shown in Table I:

Table II shows the number of treatments sent from the laboratory by fiscal years and illustrates the increase in the use of the virus from the beginning of the service to the present.

TABLE I.

NUMBER OF TREATMENTS SENT FROM THE HYGIENIC LABORATORY FROM
AUGUST, 1908, TO JULY 1, 1913.

<i>Sent to</i>	<i>Number of Treatments.</i>	<i>Sent to</i>	<i>Number of Treatments.</i>
Alabama.....	1,230	North Carolina.....	841
Arkansas.....	16	New York.....	1
Arizona.....	6	North Dakota.....	25
California.....	316	Ohio.....	1
Colorado.....	9	Oregon.....	15
Delaware.....	60	Canal Zone.....	75
Illinois.....	222	Porto Rico.....	8
Indiana.....	196	Rhode Island.....	6
Iowa.....	144	South Carolina.....	184
Kansas.....	81	Tennessee.....	76
Kentucky.....	116	U. S. Army.....	25
Massachusetts.....	4	U. S. Navy.....	3
Maryland.....	2	Virginia.....	263
Nebraska.....	2	Washington.....	12
New Jersey.....	1	Wisconsin.....	260
Total.....		4,200	

TABLE II.

NUMBER OF TREATMENTS DISTRIBUTED BY FISCAL YEARS.

Month.	1909.	1910.	1911.	1912.
July.....	30	53	68	113
August.....	29	52	93	101
September.....	43	56	58	93
October.....	54	72	91	105
November.....	58	56	94	88
December.....	48	38	75	80
January.....	68	72	79	125
February.....	45	80	71	112
March.....	68	67	111	145
April.....	92	80	135	99
May.....	73	80	152	158
June.....	75	84	79	134
Total.....	683	790	1,106	1,353

Table III shows the number of treatments sent out, by months, for the fiscal years 1909-12. As will be seen from the table, there was no very significant difference in the number of treatments by months and certainly

TABLE III.

NUMBER OF TREATMENTS, BY MONTHS, FOR FISCAL YEARS 1909-12.

<i>Month.</i>	<i>Treatments Sent Out.</i>	<i>Months.</i>	<i>Treatments Sent Out.</i>
July.....	204	February.....	217
August.....	275	March.....	180
September.....	250	April.....	332
October.....	322	May.....	342
November.....	296	June.....	279
December.....	241		
January.....	240	Total.....	3,178

no preponderance for the so-called "dog days," which are so closely associated by the laity with the occurrence of rabies in animals.

During the calendar years 1909, 1910, 1911, and 1912 treatments for 3,145 individuals were sent from the laboratory. It is probable that not all of the 3,145 treatments were utilized, as in some instances (such as the Canal Zone) beginning treatments were sent out on certain days as a matter of routine. Among the persons treated with the virus, only two developed hydrophobia fifteen days or longer after completing treatment, which gives a percentage of about 0.06 of 1 per cent. who developed the disease within two weeks or longer after completion of the treatment.

Of those treated with the 3,145 treatments there were 13, or 0.4 of 1 per cent. who developed hydrophobia within less than 36 days after beginning treatment (treatments extend over 21 days). The time of onset in these 13 cases in relation to beginning of treatment was as follows: 3 days, 10, 10, 13, 14, 15, 16, 16, 17, 17, 24, 27, and 30 days respectively. The case noted as having developed the disease three days after beginning treatment had not begun treatment until nine days after the bite.

From April 28, 1908, to July 1, 1913, antirabic virus has been administered at the Hygienic Laboratory in Washington to 523 persons. Of these 523 persons, one or about .2 of 1 per cent., developed rabies and died therefrom. Two of the 523 developed so-called "treatment paralysis," both ending in complete recovery.

It is seen that the proportion of males to females was more than double, and that 315 were under thirty years of age.

There were 199 patients who had their wounds cauterized and 324 had no local treatment.

The records show that the animal concerned was a dog in 434 cases, a cat in forty, a horse in fourteen, a member of the bovine species in twenty-eight, and various other animals in seven cases.

The ownership of the animal was known in 358 and unknown in 165 instances. In other words, in 68.4 per cent. of the cases the biting animal was owned and the responsibility for the possibility of infection and the annoyance of treatment lay upon the owner of the animal.

Classified according to the evidence of rabies in the biting animal, we find that a positive diagnosis of rabies was made by laboratory examination in 387 cases; by a veterinarian in twenty-seven instances; and was uncertain in 103 cases. In six cases the laboratory examination was negative.

While this work of the Hygienic Laboratory has been the means of making more accessible the antirabic treatment to persons exposed to the infection of rabies, there does not seem to have been in the United States a decrease in rabid animals or infected localities. Stimson* showed that there was a decrease in the deaths of human beings from rabies, in 1911,

TABLE IV.

SHOWING NUMBER OF PATIENTS GIVEN ANTIRABIC TREATMENT AT THE HYGIENIC LABORATORY FOR THE FISCAL YEARS 1909 TO 1913, BY SEX AND AGE GROUPS.

Age Group (Years).	1909.*			1910.			1911.			1912.			1913.			Totals.		
	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
1 to 4. . . .	9	5	14	3	0	3	10	7	17	3	1	4	7	5	12	32	18	50
5 to 9. . . .	16	3	19	8	1	9	17	11	28	10	4	14	8	10	18	59	29	88
10 to 14. . . .	10	2	12	3	0	3	6	4	10	5	4	9	10	5	15	34	15	49
15 to 19. . . .	7	2	9	2	3	5	8	3	11	6	1	7	0	3	3	23	12	35
20 to 29. . . .	27	3	30	7	6	13	12	4	16	10	4	14	17	3	20	73	20	93
30 to 39. . . .	16	11	27	9	0	9	11	5	16	12	7	19	11	6	17	59	29	88
40 to 49. . . .	17	0	17	3	2	5	8	4	12	7	1	8	10	5	15	45	12	57
50 to 59. . . .	3	1	4	4	0	4	4	1	5	4	1	5	3	1	4	18	4	22
60 and over	1	0	1	3	0	3	3	1	4	1	0	1	4	0	4	12	1	13
Not stated. .	1	2	3	1	2	3	4	5	9	2	1	3	7	3	10	15	13	28
Total. . . .	107	29	136	43	14	57	83	45	128	60	24	84	77	41	118	370	153	523

* Includes last two months of fiscal year 1908

of over 12 per cent. as compared with 1908, but that the number of infected localities had increased from 534 in 1908 to 1,381 in 1911 and that during the same period the disease had spread to the Pacific Coast states—states which were apparently free from the disease in 1908. In 1908 there were twenty-three institutions in the United States where the antirabic treatment was administered; in 1911 there were not less than forty-two, and the number in 1913 is doubtless still larger. In addition, there are at the present time nine firms or laboratories that are licensed by the secretary of the treasury to furnish virus for use by practising physicians at near or distant points.

*Stimson, A. M.: Rabies in the United States during the year 1911. Public Health Reports, Vol. 27 No. 28, July 12, 1912.

It is to be greatly regretted that, while the use of the virus for the treatment of persons bitten has been rendered so much more accessible, the enforcement of measures to prevent the running at large of rabid animals has not been equally advanced. There is urgent need for the enactment

TABLE V.

SHOWING LOCATION OF BITES AND SEVERITY OF WOUNDS ON PATIENTS GIVEN ANTIRABIC TREATMENT AT THE HYGIENIC LABORATORY FOR THE FIVE FISCAL YEARS 1909 TO 1913.

	1909.*	1910.	1911.	1912.	1913.	Totals.
Location of bites or wounds:						
Finger.....	27	18	20	21	17	103
Hands.....	37	10	41	23	44	155
Forearm.....	22	9	11	12	17	71
Arm.....	2	2	5	4	6	19
Feet.....	5	3	3	3	7	21
Legs.....	19	3	21	14	14	71
Thighs.....	12	2	7	2	3	26
Neck.....	0	0	0	0	1	1
Face.....	10	10	11	10	10	51
Scalp.....	1	0	0	2	0	3
Shoulder.....	0	0	0	0	0	0
Buttock.....	1	0	2	0	0	3
Chest.....	1	0	1	1	0	3
Abdomen.....	0	0	2	0	0	2
Not stated.....	4	2	11	2	6	25
More than one region	5	2	7	10	7	31
Severity of bites or wounds:						
Slight.....	76	33	86	51	70	316
Severe.....	24	9	12	17	18	80
Wounds not bites	33	15	30	16	30	124
Contact, no wound	3	0	0	0	0	3

*Includes last two months of fiscal year 1908.

and enforcement of a law or regulations, such as those endorsed at the conference of State Health Officials with the Public Health Service in 1910.

That rabies can be eradicated or greatly reduced has been demonstrated by the success of suppressive measures in England, Scandinavia, and certain parts of Germany. And it is reasonable to suppose that the enforcement of similar measures against the disease in the United States should result in a decrease of the prevalence of rabies in this country.

CHILD HYGIENE.

WILLIAM J. GALLIVAN, M. D.,
Boston, Mass.

Read before the Massachusetts Association of Boards of Health, Boston, Mass., January 29, 1914.

It is generally conceded that many a man in the prime of life is laid low with incurable illness which can be traced to infection of early childhood. As examples of such infection, we can refer to scarlet fever and its sequelæ of chronic bright's disease; to tonsillitis with its sequelæ of defective tonsils, acute infectious arthritis, and valvular heart disease. And in many quarters, it is believed that the toxins of infantile gastro-enteritis produce sequelæ equally disastrous if not so well recognized.

So, preventive medicine finds its most fertile field among the communicable diseases of childhood and looks to boards of health as the most powerful agent for development and growth.

The great cities of this country recognize this condition and now maintain in their boards of health, divisions of child hygiene. The National Government has recently incorporated in its Department of Commerce and Labor a division of child welfare and it can be safely asserted that no health department is properly organized which does not include in its field of activities a division devoted to such work.

The Division of Child Hygiene of the Boston Board of Health was organized in 1911. Medical inspection of schools had been conducted long before this date. And it is our boast that this particular branch of the work had its birth in Boston, due to the initiative of the Nestor of this Association, Dr. Samuel H. Durgin.

Pre-natal and post-natal work was started at this time by two nurses, who attempted to cover the whole city.

However, in 1911, the various threads were gathered together resulting in an organized department.

The Division of Child Hygiene of the Boston Board of Health is concerned with the physical welfare of every child in Boston from a period before birth up to the age of 16 years. Its work is sub-divided into three divisions:

- 1st, Pre-natal and Post-natal work.
- 2d, Medical Inspection of Schools.
- 3d, Physical Examination of Licensed Minors.

The physical examination of licensed minors is conducted pursuant to statute law which requires that every child between the ages of 14 and 16 years must undergo a physical examination in order to determine whether

or not the applicant is physically fit for the employment which he elects. Applicants ill with demonstrable tuberculosis are denied certificates; those ill with organic cardiac disease are not allowed to engage in laborious occupation; the unvaccinated and those suffering from remediable communicable disease suffer a postponement in the issuance of a certificate.

Medical inspection of schools has for its object:

1st, The protection of the school children from contagion unrecognized by teacher or parent.

2d, The detection of defects which if allowed to remain uncorrected would result in permanent injury, thus impairing efficiency and inviting criticism of the waste of public money for public education.

Every school building in the city, public and parochial, is visited by the school physicians on every school morning of the year. The work consists of a morning inspection and an annual physical examination.

At this morning inspection, every pupil showing symptoms of illness is sent home with a note to his parent or guardian, stating the diagnosis, if possible, and advising that the child be placed under medical care. At the morning inspection, the school physician examines every child returning to school after absence on account of illness or previous exclusion or from unknown cause.

Physical Examination of the pupils in the public schools is authorized by Chapter 302, Section 5, Acts of 1906, which requires that every child in the public schools shall be carefully examined at least once in every school year in order to determine whether he is suffering from any defect or disability tending to prevent his receiving the full benefit of his school work.

Pursuant to this law, and with the consent of the authorities in charge of the parochial schools, a physical examination is made once a year of every school child in Boston, numbering, in 1913, 123,000. A record of such examination is made on a card which is kept in the school building and open to the scrutiny of principal and teachers.

Notice of defects detected is sent to the parent or guardian of each pupil and a request is made that the family physician, family dentist or medical charity be consulted concerning the treatment of the defects noted. A duplicate copy of such record card is kept on file at the central office. This physical examination record card provides for the result of the Physical Examination of the pupil from the time he enters the kindergarten class until he is graduated from the high or normal school and accompanies the pupil from grade to grade. The result of such examinations is recorded on the card kept in the school building and duplicates are mailed to the central office.

The examination covers the topics enumerated as follows: mental deficiency; defective nasal breathing, anterior, posterior; hypertrophied

tonsils; defective teeth; primary, secondary; defective palate; cervical glands; pulmonary disease, tuberculosis, non-tuberculosis; cardiac disease, organic, functional; nervous disease, organic, functional; chorea; orthopedic defects, tuberculosis, non-tuberculosis; skin; rickets; malnutrition.

The results of the first year's examination showed that 65 per cent. of the school children were physically defective. The result of the second year's examination showed an improvement in conditions, defects being corrected to an extent varying from 25 per cent. in teeth corrections to 75 per cent. in skin corrections. The result of this year's examination is not available on account of incomplete returns, but a review of the returns at hand shows such an improvement over last year as to lead to hopeful predictions, corrections varying from 30 per cent. in teeth corrections to 80 per cent. in skin.

The consoling feature of the work is that many of the defects are slight and easily remedied. Of the total number of children thus far reported as defective, 50 per cent. have only one defect, viz., defective teeth. The serious defects such as pulmonary tuberculosis, organic cardiac disease, forming a very small percentage of the total number.

Medical inspection of schools has made a noteworthy contribution to the practice of medicine. It has demonstrated that an hypertrophied tonsil may many times be physiological and due to the eruption of secondary teeth, and so, many nose and throat men refuse to operate on such tonsils until teeth due at certain ages have appeared. It has demonstrated that enlarged cervical glands are rarely primarily tuberculous; that they are due to defective teeth, defective tonsils, adenoids and pediculi. And, as originally claimed by Donoghue, the removal of the cause results in cure.

A study of these defects reveals the information that a great majority of defects are due to conditions which are best remedied before the age of five years, the generally accepted period of school age. Examples of such defects are the presence of adenoids whose removal is advised before bony changes occur, resulting in permanent deformity and before injury is done to the drum of the ear. Care of primary teeth will install the habit of oral hygiene and pave the way for the better reception of the permanent teeth. Anaemia, malnutrition and orthopedic defects are better handled at this age and in many instances prevented.

This is the work of the pre-natal and post-natal division.

For the year ending December 31, 1913, there were born in Boston, 19,300 babies.* Of this number, 1,497 died before reaching the age of one year. A more minute subdivision shows that 295 died within twenty-four hours of birth; 268 from one day to one week; 321 from one week to one

*These statistics must not be confused with the *Annual Statistics on Infant Mortality*. They are estimated on an entirely different basis.

month; 229 from one month to three months; 266 from three months to six months; 96 from six months to nine months and 22 from nine months to twelve months. To recapitulate, 1,113 of these babies died before reaching the age of three months.

The causes of these deaths, as variously reported, is as followed:

Disorders of nutrition	458
Prematurity	335
Obstetrical trauma	168
Congenital defects	118
All other causes	418

This is the condition, not alone peculiar to our city, but it is a story repeated the world over. For years, numerous agencies have tried to cope with these conditions. In spite of medical skill in diagnosis and treatment, this annual holocaust continues. So that all eyes turn to preventive medicine for relief.

Owing to a satisfactory system of reporting births, the division of child hygiene is furnished with a list of the name and address of every baby born in Boston. One visit is made to the home of every such baby by the nurses connected with this department. Cases are revisited according to conditions found, it being obvious that the breast-fed baby, the baby of the well to do and those of the well informed require less supervision than those of their less fortunate neighbors. The division of child hygiene works in perfect harmony with every agency in the city engaged in child welfare work. Through such team work, infant mortality has been reduced in our city from 126 deaths per 1,000 births in 1911, to 117 deaths per 1,000 births in 1912, to 107 deaths per 1,000 births in 1913. Encouraging as the results are, they are far from satisfactory and are capable of a tremendous improvement.

At such visits, mothers are urged to nurse their babies. The danger of bottle feeding is explained; and repeated visits are made to render assistance where needed, and to demonstrate the city's interest in the value of human life. Every mother is provided with a printed circular issued by this department containing information on the care of the baby and telling of the dangers and pitfalls incident to early life. All children under school age are subject to the nurse's scrutiny on these visits and medical aid obtained for cases which otherwise would have passed into the neglected column. A continuance of this work warrants the assertion that the children of the future will enter school far better equipped physically than their predecessors.

Upon these visits, the nurses have established a clientele among whom pre-natal work has been done to a slight extent. Personal visits are made to such women by the nurses of this department and advice and instruction

on pertinent matters is given. Particular stress is laid on the importance of competent medical attendance with a view of diminishing the number of deaths due to obstetrical trauma. A circular is now in process of preparation by the division of child hygiene for universal distribution, containing advice on general hygiene, which cannot fail to achieve results in diminishing the deaths due to prematurity. The value of breast feeding is emphasized at a time when this form of nourishment can be obtained and the results of this instruction raises our hope of reducing the number of deaths annually due to disorders of nutrition.

Additional nurses and more frequent visits will prove a powerful aid in the development of this work. Municipal retreats, where the expectant mother may obtain rest, nutrition and supervision; municipal hospitals, where the poor and needy may obtain competent medical attention; and for those in moderate circumstances who prefer to stay at home under the care of the family physician, the training of women attendants who will take the place of the untrained neighbor whose sympathy is commendable, but whose services are execrable, and the hospital-trained nurse whose charges are prohibitive, are suggestions which can easily be adopted by municipal authorities who now recognize that this work is as important a function of government, as fire, police or school activities.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

The annual meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boylston Street, Boston, Thursday, January 29, 1914, under the presidency of Dr. Samuel H. Durgin.

The following applicants were elected members of the Association: Charles W. Milliken, Barnstable Board of Health; Dr. James R. Kirby, Clinton Board of Health; Dr. Harry R. Coburn, State Infirmary, Tewksbury; Rev. William B. Geoghegan, New Bedford; Dr. Lewis W. Hackett, Cambridge; Dr. Francis B. Grinnell, Dover; Dr. Lawrence Poole, bacteriologist, Gardner Board of Health; Joseph Dee, Jr., agent, Concord Board of Health; Henry N. Jones, bacteriologist, Massachusetts State Board of Health; M. J. Butler, Leominster Board of Health; Dr. Oliver H. Howe, school physician, Cohasset.

REPORT OF THE TREASURER FOR 1913.

Francis George Curtis, Treasurer, in account with the Massachusetts Association of Boards of Health:

Dr.	
Balance from 1912.....	\$1,603.85
Dues for 1912.....	19.00
Dues from 1913.....	414.50
Dues from 1914.....	4.00
Interest, Savings Bank.....	42.02
Interest, National Bank.....	7.24
	<hr/>
	\$2,090.61
Balance to 1914.....	\$1,545.83
In West Newton Savings Bank.....	1,082.42
First National Bank of West Newton.....	462.41
Cash in hands of treasurer.....	1.00
Cr.	
American Public Health Association Journals.....	\$184.25
Printing, etc., for secretary.....	73.42
Printing, etc., for treasurer.....	16.75
Clerical assistance for secretary.....	12.00
Clerical assistance for treasurer.....	3.00
Arthur T. Lovell, reporting meetings.....	94.52
Legislative Committee:	
Printing.....	15.56
Expenses.....	5.40
Milk Committee:	
Expenses.....	9.00
Committee on Uniform Health Reports:	
Reprints.....	45.00
Stamps and envelopes.....	16.90
Clerical assistance.....	8.00
B. R. Rickards:	
Back numbers of Journal.....	13.00

F. G. Curtis, treasurer:

Expressage and sundry expenses.....	15.30
Stereopticon.....	10.00
Cigars, July meeting.....	6.18

Dr. F. X. Mahoney:

Sundry expenses, July, 1912, meeting.....	16.00
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Dr. G. S. Fuller:

Overpayment of dues.....	.50
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Total expenses.....	\$544.78
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Respectfully submitted,

FRANCIS GEO. CURTIS,
Treasurer.

ELECTION OF OFFICERS.

The Committee on Nominations presented the following list of nominees for the ensuing year:

President, Mr. James C. Coffey, Worcester.

First Vice-President, Dr. Milton J. Rosenau, Brookline.

Second Vice-President, Dr. Charles V. Chapin, Providence, R. I.

Treasurer, Dr. Francis G. Curtis, Newton.

Secretary, Dr. Francis H. Slack, Boston.

Executive Committee (term, two years), Dr. Adam S. MacKnight, Fall River; Dr. Francis X. Mahoney, Boston; Dr. Frederick H. Thompson, Fitchburg; Mr. Raymond L. Newcomb, Salem; Dr. Frank G. Wheatley, North Abington.

On motion duly seconded, the secretary was instructed to cast the ballot of the Association for the above officers. Motion was carried and the officers declared elected.

ADOPTION OF NEW CONSTITUTION.

The new constitution was unanimously adopted by the association with the amendment of striking out the word "two" and inserting in place thereof the word "one" in Article V.

Doctor Gay presented the following resolution:

WHEREAS, One of the most important functions of boards of health is the prompt return of reliable vital statistics, and

WHEREAS, The chief factors of vital statistics, the births and deaths, are medical matters and hence necessarily in charge of physicians, and

WHEREAS, By reason of the character of the data involved, their supervision and tabulation can be much better done by a physician, who has been properly trained and educated for this work, and

WHEREAS, The vital statistics of Massachusetts are in charge of the Secretary of State, instead of the medical department of the state, now, be it

Resolved, By the Massachusetts Association of Boards of Health, in annual meeting assembled, that it would be for the distinct advantage of the public welfare to have the vital statistics placed in charge of the State Board of Health for their proper arrangement and tabulation previous to their being given in charge of the Secretary of State for permanent custody. By this means the vital statistics would remain in the hands of the medical profession, where they naturally belong, until they have been put in proper shape for permanent record.

Resolved, That appreciating the importance of the desired change and of the efforts now being made to bring it about, this Association most earnestly approves of House Bill, No. 1348, which simply directs that the vital statistics of this state on their way to the office of the secretary of state shall pass through the office of the State Board of Health for the purpose of permanent arrangement and tabulation.

Resolved, That a committee of three be appointed by the President to represent this association at the hearings before the legislature, or its committees, and to take such other action as may seem wise to accomplish the object in hand.

The resolution was unanimously adopted.

Report of Committee Upon Period of Isolation and Exclusion from School in Cases of Communicable Disease.

The committee appointed to consider and report upon the period of isolation and exclusion from school in cases of communicable disease, hereby submit the following report:

Your committee realized that there are many communicable diseases which, in the stage of our present civilization, it is impracticable to isolate; that there are many communicable diseases whose method of transmission is not definitely known, therefore it has been deemed expedient to omit such from this list.

Your committee has approached this task with an earnest desire to annihilate the superstitions which have surrounded the theory of the transmission of disease; to eliminate the hardships attendant upon unreasonable isolation and to educate the public in the methods of contracting disease.

Your committee feels that the adoption of these recommendations by the Boards of Health of the various cities and towns of the Commonwealth would result in a more uniform and more reasonable period of isolation and exclusion.

WILLIAM J. GALLIVAN, M. D., *Chairman*.

FRANCIS G. CURTIS, M. D.,

FRED W. HOWE,

EDWIN H. PLACE, M. D.

DIPHTHERIA.

Modes of Infection:

Secretions of the upper air passage or from any infected area.

Transmission:

By direct contact with patient or carrier.

By modified contact, *i. e.*, articles which have been recently infected by the fresh secretions.

Period of Isolation:

Until two successive negative cultures have been obtained from both nose and throat; the last culture in each case to be taken by the Board of Health after an interval of at least twenty-four hours.

Method of Control:

A. Recognition of the disease.

1. By inspection.

2. By culturing all inflammations of mucous membranes.

3. By culturing all persons known to be exposed.

B. Isolation.

1. Home.

2. Hospital.

C. Immunization.

1. By anti-toxin.

D. Disinfection.

1. By boiling objects infected.

2. By scrubbing woodwork and furniture.

E. Schools.

1. Exclusion. All members of a household where a person is ill with diphtheria shall be excluded from school until one week has expired from the date of the last exposure to the disease, unless immunized by anti-toxin and showing two negative cultures.
2. Closing of schools. Schools should not be closed during an epidemic of diphtheria; daily inspection and culturing will achieve better results.
3. All members of a household where a person is isolated on account of being ill with diphtheria may be allowed to continue at their usual occupations, except those who are engaged in the handling of milk.

SCARLET FEVER.

Modes of Infection:

Secretions of the upper air passages; mucous or serous discharge from the ear or any skin lesion of the body.

Transmission:

By direct contact with patient or carrier.

By modified contact, *i. e.*, articles which have been recently infected by the fresh secretions.

Period of Isolation:

There should be a minimum isolation period of five weeks; period of isolation should continue during the presence of any discharge from the ear, nose or lesions of the skin.

Method of Control:

- A. Recognition of disease.
- B. Isolation.
 1. Home.
 2. Hospital.
- C. Immunization.
 1. Uncertain.
- D. Disinfection.
 1. By boiling objects infected.
 2. By scrubbing woodwork and furniture.

E. Schools.

1. Exclusion. All members of a household where a person is ill with scarlet fever shall be excluded from school until one week has expired from the date of the last exposure to the disease unless immunized by a previous attack of the disease.
2. Closing of schools. Schools should not be closed during an epidemic of scarlet fever. Daily inspection of pupils will achieve better results.
3. All members of a household where a person is isolated on account of being ill with scarlet fever may be allowed to continue at their usual occupation, except those who are engaged in the handling of milk.

GERMAN MEASLES.

Modes of Infection:

Secretions of the upper air passages.

Transmission:

By direct contact with patient.

Period of Isolation:

Period of isolation should continue for seven days after the appearance of the eruption.

Method of Control:

- A. Recognition of disease.
- B. Isolation.
 1. Home.
- C. Immunization.
 1. None.
- D. Disinfection
 1. Unnecessary.

E. Schools.

1. Exclusion. Only the patient shall be excluded from school.
2. Closing of Schools. Schools should not be closed during an epidemic of German measles. Daily inspection of pupils will achieve better results.
3. All members of a household where a person is isolated on account of being ill with German measles may be allowed to continue at their usual occupations.

MEASLES.

Modes of Infection:

Secretions of the upper air passages.

Transmission:

By direct contact with patient.

Period of Isolation:

Period of isolation should continue for ten days from the appearance of the eruption.

Method of Control:

A. Recognition of the Disease.

1. Koplik spots appear from one to six days before appearance of rash.

B. Isolation.

1. Home.
2. Hospital.

C. Immunization.

1. None.

D. Disinfection.

1. Unnecessary.

E. Schools.

1. Exclusion. All members of a household where a person is ill with Measles shall be excluded from school until two weeks has expired from the date of the last exposure, unless immunized by a previous attack of the Disease.
2. Closing of Schools. Schools should not be closed during an epidemic of measles. Daily inspection of pupils will achieve better results.
3. All members of a household where a person is isolated on account of being ill with Measles may be allowed to continue at their usual occupations.

CHICKEN POX.

Modes of Infection:

Lesions of the skin and mucous membrane.

Transmission:

1. By direct contact with patient.
2. By modified contact, *i. e.*, articles which have been recently infected.

Period of Isolation:

Period of isolation should continue during the presence of the skin or mucous membrane lesion.

Method of Control:

A. Recognition of the disease.

B. Isolation.

1. Home.
2. Hospital.

C. Immunization.

1. None.

D. Disinfection.

1. By boiling objects infected.
2. By scrubbing woodwork and furniture.

E. Schools.

1. Exclusion. All members of a household where a person is ill with chicken pox shall be excluded from school for three weeks after the last exposure to the disease, unless immunized by previous attack of the disease.
2. Closing of Schools. Schools should not be closed during an epidemic of chicken pox. Daily inspection of pupils will achieve better results.
3. All members of a household where a person is isolated on account of being ill with chicken pox may be allowed to continue at their usual occupations.

WHOOPIING COUGH.

Modes of Infection:

Secretions of the upper air passages.

Transmission:

By direct contact with patient.

Period of Isolation:

There should be a minimum isolation period of three weeks; period of isolation should continue during the paroxysmal stage.

Method of Control:

A. Recognition of disease.

1. Catarrhal symptoms of nose and eyes precede the paroxysmal stage.

B. Isolation.

1. Home.
2. Hospital.

C. Immunization.

1. Uncertain.

D. Disinfection.

1. Unnecessary.

E. Schools.

1. Exclusion. All members of a household where a person is ill with whooping cough shall be excluded from school until two weeks has expired from the date of the last exposure to the disease, unless immunized by previous attack of the disease.
2. Closing of Schools. Schools should not be closed during an epidemic of whooping cough. Daily inspection of pupils will achieve better results.
3. All members of a household where a person is isolated on account of being ill with whooping cough may be allowed to continue at their usual occupations.

MUMPS.

Modes of Infection:

Secretions of the mouth.

Transmission:

By direct contact with the patient.

Period of Isolation:

There should be a period of isolation for three weeks.

Method of Control:

A. Recognition of the disease.

1. Steno's duct is inflamed in the early stage of disease.

B. Isolation.

1. Home.
2. Hospital.

C. Immunization.

1. None.

D. Disinfection.

1. Unnecessary.

E. Schools.

1. Exclusion. All members of a household in which a person is ill with mumps shall be excluded from school until two weeks has expired from the date of the last exposure, unless immunized by a previous attack of the disease.
2. Closing of Schools. Schools should not be closed during an epidemic of mumps. Daily inspection of pupils will achieve better results.
3. All members of a household where a person is isolated on account of being ill with mumps may be allowed to continue at their usual occupations.

TRACHOMA.

Modes of Infection:

Secretions of the eye.

Transmission:

By direct contact with patient.

By modified contact with articles which have been recently infected by fresh secretions.

Period of Isolation:

Until two weeks have expired since the last appearance of secretion, with freedom from redness of the conjunctiva.

Method of Control:

A. Recognition of disease.

B. Isolation.

1. Home.

2. Hospital.

C. Immunization.

1. None.

D. Disinfection.

1. By boiling objects infected.

2. By scrubbing woodwork and furniture.

E. Schools.

1. Exclusion. Only the patient shall be excluded from school.

2. Closing of Schools. School should not be closed during an epidemic of trachoma. Daily inspection of pupils will achieve better results.

3. All members of a household where a person is ill with trachoma may be allowed to continue at their usual occupations.

INFLUENZA.

Modes of Infection:

Secretions of the upper air passages.

Transmission:

By direct contact with patient.

By modified contact, *i. e.*, articles which have been recently infected by the fresh secretions.

Period of Isolation:

Until subsidence of catarrhal symptoms.

Method of Control:

A. Recognition of disease.

B. Isolation.

1. Home.

2. Hospital.

C. Immunization.

1. None.

D. Disinfection.

1. Unnecessary.

E. Schools.

1. Exclusion. Only the patient to be excluded from school.

2. Closing of Schools. Schools should not be closed during an epidemic of influenza. Daily inspection of pupils will achieve better results.
3. All members of a household where a person is isolated on account of being ill with influenza may be allowed to continue at their usual occupations.

TYPHUS FEVER.

Modes of Infection:

From the blood stream.

Transmission:

Through pediculi.

Period of Isolation:

Until recovery, and until the patient is free from pediculi.

Method of Control:

A. Recognition of the disease

B. Isolation.

1. Home.

2. Hospital.

C. Immunization.

1. None

D. Disinfection.

1. Extermination of pediculi.

E. Schools.

1. Exclusion. All members of a household where a person is ill with typhus fever shall be excluded from school until free from pediculi.

2. Closing of Schools. Schools should not be closed during an epidemic of typhus fever. Daily inspection of pupils will achieve better results.

3. All members of a household where a person is isolated on account of being ill with typhus fever may be allowed to engage in their usual occupations provided they are free from pediculi.

TYPHOID FEVER.

Modes of Infection:

Urine and feces.

Transmission:

By direct contact with patient or carrier.

By modified contact, *i. e.*, articles which have been recently infected; particularly milk.

Period of Isolation:

Until recovery and until urine and feces are free from bacilli.

Method of Control:

A. Recognition of disease.

1. Conradi test.

2. Widal test.

B. Isolation.

1. Home.

2. Hospital.

C. Immunization.

1. Typhoid vaccine.

D. Disinfection.

1. By boiling objects infected.

2. By scrubbing woodwork and furniture.

E. Schools.

1. Exclusion. All members of a household where a person is ill with typhoid fever shall be excluded from school until two weeks have expired from the date of the last exposure to the disease, unless immunized with typhoid vaccine or by previous attack of the disease.

2. Closing of Schools. Schools should not be closed during an epidemic of typhoid fever. Daily inspection of pupils including Conradi and Widal tests will achieve better results.
3. All members of a household where a person is isolated on account of being ill with typhoid fever may be allowed to continue at their usual occupations except those who are engaged in the handling of milk.

CHOLERA.

Modes of Infection:

Feces.

Transmission:

By direct contact with patient or carrier.

By modified contact, *i. e.*, articles which have been recently infected.

Period of Isolation:

Until the feces are free from bacilli.

Method of Control:

A. Recognition of the disease.

B. Isolation.

1. Home.

2. Hospital.

C. Immunization.

1. Doubtful.

D. Disinfection.

1. By boiling articles infected.

2. By scrubbing woodwork and furniture.

E. Schools.

1. Exclusion. All members of a household where a person is ill with cholera shall be excluded from school until one week has expired from the date of the last exposure to the disease.

2. Closing of Schools. Schools should not be closed during an epidemic of cholera. Daily inspection of pupils will achieve better results.

3. All members of a household where a person is isolated on account of being ill with cholera may be allowed to continue at their usual occupations, except those who are engaged in the handling of milk.

SMALLPOX.

Modes of Infection:

Lesions of the skin and mucous membrane.

Transmission:

By direct contact with patient.

By modified contact, *i. e.*, articles which have been recently infected.

Period of Isolation:

Until recovery and lesions have healed.

Method of Control:

A. Recognition of the disease.

B. Isolation.

1. Hospital.

C. Immunization.

1. By vaccination.

D. Disinfection.

1. By boiling objects infected.

2. By scrubbing woodwork and furniture.

E. Schools.

1. Exclusion. All members of a household where a person is ill with smallpox shall be

excluded from school until two weeks have expired from the date of the last exposure to the disease, unless immunized by recent successful vaccination.

2. Closing of Schools. Schools should not be closed during an epidemic of smallpox. Revaccination of pupils will achieve better results.
3. All members of the household where a person is isolated on account of being ill with smallpox may be allowed to engage in their usual occupations providing they have been recently successfully vaccinated.

PULMONARY TUBERCULOSIS.

Modes of Infection.

Secretions of the upper air passages.

Transmission:

By direct contact with patient.

By modified contact, *i. e.*, articles which have been recently infected by the fresh secretions.

Period of Isolation:

Only the recalcitrant patient should be isolated.

Method of Control:

A. Recognition of the disease.

B. Isolation.

1. Hospital.

C. Immunization.

1. Doubtful.

D. Disinfection.

1. By boiling objects infected.

2. By scrubbing woodwork and furniture.

E. Schools.

1. Exclusion. Only the patient shall be excluded from school. Special schools for the tuberculous are recommended.

2. Closing of Schools. Schools should not be closed on account of the prevalence of tuberculosis. Daily inspection of pupils will achieve better results.

3. All members of a household where a person is ill with pulmonary tuberculosis may engage in their usual occupations, except those engaged in the handling of milk.

OPHTHALMIA.

Modes of Infection:

Secretions of the eye.

Transmission:

By direct contact with patient.

By modified contact, *i. e.*, articles which have been recently infected by the fresh secretions.

Period of Isolation:

Until two successive cultures, negative of gonococci, have been obtained with an interim of 24 hours, and until the purulent discharge has disappeared.

Method of Control:

A. Recognition of the disease.

1. Smears.

B. Isolation.

1. Home.

2. Hospital.

C. Immunization.

1. Silver salts.

D. Disinfection.

1. By boiling objects infected.

2. By scrubbing woodwork and furniture.

E. Schools.

1. Exclusion. Only the patient shall be excluded from school.
2. Closing of Schools. Schools should not be closed during an epidemic of ophthalmia. Daily inspection of pupils will achieve better results.
3. All members of a household where a person is isolated on account of being ill with ophthalmia may be allowed to continue at their usual occupations.

After a discussion participated in by Doctor Swarts, Mr. Coffey, Doctor Holden, Doctor Slack, Doctor Morrow, Doctor Denny, Doctor Place, Doctor Hastings, Doctor Chapin, Mr. Howe, and Doctor Gallivan, it was moved and seconded that the report be laid on the table for further consideration. Motion was carried.

PAPER PRESENTED.

Dr. W. J. Gallivan read a paper on Child Hygiene (printed in this issue of the JOURNAL).

CONCLUSION.

PRESIDENT DURGIN: Gentlemen, I could not pass from this twenty-three years of service at this end of the table to that of a more pleasing association with you in the ranks without giving you my very heartfelt thanks for the courtesies that you have always shown me, and I have the pleasure now of introducing to you your new president, Mr. Coffey of Worcester.

MR. COFFEY: Mr. President and Fellow Members: I wish I had the language that would express to you adequately my appreciation of your confidence and good will as expressed today by you in electing me to the highest office in your gift. Suffice it to say that I am very thankful and very grateful for this honor. It is especially gratifying to me to be the first successor of the only two presidents this Society, during its twenty-three years of existence, has had one of whom for more than a generation has directed the affairs of the State Board of Health and has acquired an international reputation as a pioneer in sanitary effort, the other, and the one just retiring, who has, too, for more than a generation been the chairman of the Board of Health of the City of Boston and has also been a pioneer, with an international reputation. I am conscious of the wide discrepancy that exists between those two men who have heretofore held your most important office and myself in the question of ability. However, I shall endeavor during my term of office to get as near the altitude that they have preserved during those twenty-three years as it is possible for me to attain. This Society has been to me during all those years—and I might say modestly that I was the one who started this organization some twenty-three years ago—a perpetual fountain of knowledge and information. It must be to all of you who are concerned in health work a like fountain, if you will only attend the meetings and support the officials of the organization. Without your encouragement and support they can do very little. With it a great deal can be accomplished. Today's meeting is a proof of what is possible for this organization to do. No man leaving the room today but feels a greater knowledge; even though we have not definitely decided on this important report we all must feel that we know more, and it has given us thought for the next three months, so that when we meet here in April we will be better able to discuss this important communication and settle it definitely.

Mr. Newcomb of Salem moved that the thanks of the Massachusetts Association of Boards of Health be extended to Samuel H. Durgin, M. D., the retiring president of this Association, for his very valuable guidance of the affairs of the organization during his term of office.

The motion was seconded and carried unanimously by a rising vote.

The meeting then adjourned.

MINUTES OF THE FORTY-FIRST ANNUAL MEETING OF THE AMERICAN PUB- LIC HEALTH ASSOCIATION.

COLORADO SPRINGS, COL., SEPTEMBER 9-13, 1913.

FIRST SESSION.

The forty-first annual meeting of the Association was called to order in the Antlers Hotel, Colorado Springs, Col., September 9, 1913, by President Rudolph Hering, and 200 members were present.

The minutes of the preceding meeting having been published in the JOURNAL of the Association, reading was, by unanimous consent, dispensed with.

The report of the Committee on Membership, duly approved by the Executive Committee, was then presented, recommending certain individuals for membership in the Association. It was moved that the Secretary cast the ballot of the Association for the applicants recommended. Carried unanimously.

The Secretary then cast the ballot in accordance with the instructions of the Association. (Complete list of all members elected will be found on page 356.)

The Secretary announced that the following resignations had been received during the past year: Mr. Frank Harvis Carter, Dr. Emilo del Raso, Mr. Charles Wright Dodge, Dr. Nicolas Guerola, Mr. Earle V. Manuel, Mr. Michael O'Shaughnessy, Dr. Charles O. Probst, Dr. Edward C. Register, Dr. William Wishard.

Moved and seconded that these resignations be accepted. Carried.

The Secretary also reported the following deaths since the last meeting: Dr. John Shaw Billings, Dr. J. A. Egan, Dr. James A. Exton, Dr. Rawley White Martin, Dr. Miguel Marquez, Dr. Julian Augustus Mead, Dr. Thomas B. McClintic.

On motion the meeting then adjourned.

SELSKAR M. GUNN,
Secretary.

RUDOLPH HERING,
President.

SECOND SESSION.

The meeting was called to order at 2 p. m., September 9, by the President. Papers were then read as follows:

SYMPOSIUM ON THE CONTROL AND IMPROVEMENT OF FOOD SUPPLIES.

The Function of Federal Authorities. Dr. Carl Alsberg, Bureau of Chemistry, Department of Agriculture, Washington, D. C.

The Function of State Authorities. Mr. H. E. Barnard, State Board of Health, Indianapolis, Ind.

The Function of Municipal Authorities. Dr. Ernst J. Lederle, Commissioner of Health, New York City.

The Function of Voluntary Organizations. Mr. Bailey B. Burritt, Department of Social Welfare, A. I. C. P., New York City.

The Rôle of Controlled and Guaranteed Advertising. Mr. Richard H. Waldo, *Good House-keeping Magazine*, New York City.

Reappearance of the Ghost of Malthus. Prof. William T. Sedgwick, Massachusetts Institute of Technology, Boston, Mass.

Self-Imposed Supervision by Organized Industries. Dr. H. D. Pease, New York City.

Transportation of Food Products: A Pressing Health Problem. Dr. Peter H. Bryce, Department of Immigration, Ottawa, Canada. (Read by title.)

Public Health Aspects of the Candy Industry. Prof. Samuel C. Prescott, Massachusetts Institute of Technology, Boston, Mass. (Read by title.)

The meeting then adjourned.

SELSKAR M. GUNN,
Secretary.

RUDOLPH HERING,
President.

THIRD SESSION.

The meeting was called to order at 8 p. m., the President in the Chair.

The address of welcome was delivered by the Hon. C. L. McKesson, Mayor of Colorado Springs. The responses were made as follows:

For the United States, Dr. William C. Woodward.

For the Dominion of Canada, Dr. Frederick Montizambert.

For the Republic of Mexico, Dr. Eduardo Liceaga.

For the Republic of Cuba, Dr. Mario Lebrede.

The President of the Association then delivered the annual address. The meeting then adjourned.

SELSKAR M. GUNN,
Secretary.

RUDOLPH HERING,
President.

FOURTH SESSION.

The meeting was called to order at 2 p. m., September 10, with the President in the Chair.

The Executive Committee submitted the Report of the Committee of Seven as follows:

REPORT OF THE COMMITTEE OF SEVEN.

The Committee of Seven has held four meetings since the Washington meeting of the Association.

The committee begs to state that since the Washington meeting 122 new members of the Association have been elected as provided for in Chapter 5 of the By-laws as amended December 6, 1911.

During the year the following motions have been passed by the committee:

"That the 1913 meetings of the Association be held in Colorado Springs, June 24-28, inclusive, unless the Secretary receives such information from the local people which makes it very difficult or impractical. In this event, the meetings are to be held September 9-13, inclusive, and the President and Secretary are hereby empowered to reach a definite decision.

"That the membership fee cover, so long as it is not forbidden by the Constitution, one year from the date of admission to membership.

"That there be no issue of a separate volume of Transactions, except as published in the JOURNAL.

"That the Treasurer be authorized to make a loan of \$1,000 to carry on the business of the JOURNAL.

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"That changes in the Constitution and By-laws required as result of the amendment to same passed at the last meeting and presented by the Secretary be adopted.

"That the Treasurer be authorized to take such steps as he deems necessary to raise money for the carrying on of the JOURNAL until the next annual meetings.

"That the necessary traveling and hotel expenses of the Secretary in attending the Colorado Springs meetings be paid from the treasury of the Association.

"That approximately \$100 be appropriated for the use of the Boston office for the necessary clerical expenses in carrying on a membership campaign.

"That the Treasurer be authorized to draw upon the Trust Funds of the Association deposited in the Savings Banks up to the limit of such deposits, or to negotiate loans up to the limit of such saving bank deposits, using the savings bank books as collateral therefor, to meet the current expenses of the Association."

The committee reports that the Treasurer's report appended herewith has been audited by Haskin & Sells, Public Accountants, and also by a special committee consisting of Drs. Bryce and Pease, and found correct in both instances.

RUDOLPH HERING,
Chairman.

It was moved and seconded that the report be adopted as read. Carried.

On behalf of the Executive Committee the Secretary then submitted the following report of the Treasurer, duly audited and approved by the Committee of Seven as follows:

REPORT OF THE TREASURER AMERICAN PUBLIC HEALTH ASSOCIATION, SEPTEMBER 1, 1913.

August 31, 1912, balance, \$372.47

RECEIPTS.

Association dues,	\$2,418.00
Subscriptions to JOURNAL,	5,217.58
Sales of JOURNAL,	116.50
Advertisements,	931.34
Sales of water analysis report,	1,284.90
Sales of transactions,	523.87
Donations,	400.00
Sales of milk and air analysis reports,	19.81
Loans, Lincoln Trust Co.,	2,500.00
Miscellaneous receipts, refunds, etc.,	151.01
	<hr/> 13,563.01
	<hr/> \$13,935.48

DISBURSEMENTS.

For Association:

Printing,	\$526.72
Stationery,	338.88
Postage,	232.00
Miscellaneous expenses,	343.92
Traveling expenses,	96.55
Printing transactions, Vols. 36 and 37,	513.78
Reporting Washington meeting,	125.00
Printing water analysis reports,	730.19
	<hr/> \$2,907.04

For Journal:

Salaries,	\$2,700.00	
Printing JOURNAL,	2,501.85	
Mailing JOURNAL,	345.93	
Stationery and office printing,	619.75	
Postage,	551.78	
Rent, light and telephone,	540.00	
Clerical Assistance,	1,750.00	
Books, etc., purchased for resale,	102.05	
Furniture and office equipment,	119.32	
Traveling expenses,	105.70	
Miscellaneous expenses,	804.51	
	<hr/>	\$10,140.89
		<hr/>
		\$13,047.93

August 31, 1913, balance,

\$887.55

DETAILS OF BALANCE.

Lincoln Trust Co.,		\$462.55
Petty Cash Funds:		
Corn Exchange Bank,	\$400.00	
Cash in office,	25.00	
	<hr/>	425.00
		<hr/>
		\$887.55

LIVINGSTON FARRAND,
Treasurer.

BALANCE SHEET.

American Public Health Association—Condensed to show quick assets and immediate liabilities, as of date August 31, 1913.

ASSETS.

Cash:

Connecticut Savings Bank,	\$1,689.87	
National Savings Bank, New Haven,	1,148.66	
Lincoln Trust Co.,	462.55	
Petty cash funds:		
Corn Exchange Bank,	\$400.00	
Cash in office,	25.00	
	<hr/>	425.00
		<hr/>
		\$3,726.08

Accounts Receivable:

Due from sales and subscriptions,	\$360.03	
Due from earned advertising,	117.30	
	<hr/>	477.33

Total assets,

\$4,203.41

LIABILITIES.

Bills Payable:

Lincoln Trust Co., loan,	\$2,500.00
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Accounts Payable:

Due creditors on open account,	1,411.57
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Excess of quick assets over immediate liabilities,

291.84

\$4,203.41

It was moved and seconded that the Treasurer's report be accepted and placed on file. Carried.

The Executive Committee submitted the report of the Committee on Trust Funds as follows:

REPORT OF COMMITTEE ON TRUST FUNDS.

The Committee on Trust Funds begs to report the following motions passed during the year:

November 30, 1912:

"That the Committee on Trust Funds give authority to the Committee of Seven to effect a loan of \$1,000 from the special funds of the Association on the security of the bank books.

June 23, 1913:

"That the Committee on Trust Funds give authority to the Committee of Seven to draw on the Trust Funds of the Association up to the limit of such funds, or to effect a loan up to the limit of such funds using the bank books as collateral therefor."

HENRY D. HOLTON,
Chairman.

It was moved and seconded that the report of the Committee on Trust Funds be received and placed on file. Carried.

The Executive Committee submitted the report of the Committee on JOURNAL, including the report of the editor, Dr. Livingston Farrand, as follows:

Committee on Journal, American Public Health Association:

GENTLEMEN—I beg to submit the following brief report on the operations of the AMERICAN JOURNAL OF PUBLIC HEALTH from September 1, 1912, to August 31, 1913.

The editorial management has continued without change, with myself as editor, and Prof. Selskar M. Gunn of Boston as managing editor, and Dr. Philip P. Jacobs of New York as business manager. The concentration of the offices of managing editor and secretary of the Association and of editor and treasurer of the Association as well as the coöperation with the office of the *Journal of the Outdoor Life* have been successful and served to economize both time and money.

The JOURNAL has been issued monthly during the year and we feel that a constant improvement has been manifest.

The efforts to increase the circulation of the JOURNAL and to obtain new advertising have been unremitting.

With regard to the circulation of the JOURNAL it is gratifying to report that there are now 2,429 subscribers, of which number 632 are members of the American Public Health Association, the balance being independent subscribers to the JOURNAL. In addition to this number, every three months 240 members of the Massachusetts Association of Boards of Health receive the JOURNAL by arrangement with that society. When we compare this circulation with that reported a year ago, namely, 1,104, the increase is most encouraging.

With regard to advertising, the amount of paid advertising in the September, 1913, number of the JOURNAL is fourteen pages. This feature has remained almost stationary, it having been found most difficult to obtain advertising while the circulation remained small. For this reason it is clear that until the subscription list of the JOURNAL is enlarged we cannot count upon any greatly increased income from the advertising pages. No effort is being spared, however, to enlist the support of the various commercial and other agencies which may legitimately use the advertising pages of the JOURNAL and which may expect to obtain benefit therefrom.

The financial operations of the JOURNAL are contained in the report of the TREASURER of the Association, a copy of which is attached hereto.

In the opinion of the editorial staff the future prospects are most promising if sufficient financial support for the JOURNAL can be assured until it is placed upon a self-supporting basis. After careful reflection, we are of the opinion that if the JOURNAL is to be continued along its present lines it would be wise to raise a fund of at least \$4,000 to insure its successful operation for the ensuing year. This would enable your committee to carry on our work without embarrassment. The response which has already been received from those whom we have approached on this matter leads us to suppose that such an amount can be secured without undue difficulty. I trust that your committee will recommend such a step and that the Association will endorse it and cooperate to its successful conclusion.

Finally, may I take this opportunity to express on behalf of my editorial associates and myself our deep appreciation of the unfailing and thoroughly cordial support which your committee has given throughout the year, a support without which the successful publication of the JOURNAL would have been impossible.

Respectfully submitted,

LIVINGSTON FARRAND,

Editor.

REPORT OF COMMITTEE ON JOURNAL.

Your committee in presenting its report on JOURNAL has to express its sense of responsibility it has undertaken, establishing a journal worthy of the traditions and of the position which the American Public Health Association holds as the exponent of the most advanced scientific thought and of the experience of the leaders in public health and state medicine in the four countries of North America represented by it.

The growth of the Association from the first gathering of a few enthusiasts forty-one years ago represents the advance from a preceding period of empiricism to one in which science has laid the foundations of public health on a sane and sound foundation, and today we find associated not only physicians but also the trained exponents of bacteriology, bio-chemistry, engineering, municipal hygiene, statistics, and scientific philanthropy. The borders of our science have become enlarged until they have come to embrace almost every phase of human activity, whether physical, educational, social, industrial, engineering, or literary. The evolution has been very remarkable, and with it the position of workers in the field has been enlarged, while their scientific and public responsibilities have been increased. To meet the duties and maintain the dignity of our enlarged position, we have had to develop a means of constant communication with each other and the public.

Until very recent years we had to be satisfied with an annual meeting and the issue of our transactions, more or less late, to members; but it was long felt that some more frequently appearing exponent of every day, living, vital public health work was essential if we were going to meet the demands of those who are laboring to make public health a profession and through such to increase our influence with the public, which is at once needing and demanding instruction, and upon which in the end we must depend for the cooperation which will alone make the evolution of public health possible.

The history of how we have attempted to accomplish this is known to the older members of the Association, and the difficulties which we have met and overcome are known to many.

How your present Journal Committee has succeeded during the past eighteen months or more, those who have been receiving regularly the AMERICAN JOURNAL OF PUBLIC HEALTH have had illustrated. Had your committee had to deal only with the papers as published ten years ago, when we had only the bacteriological and chemical sections, its task would have been an easy one, but it has had to receive, adjudge, edit, and print the papers of five distinct sections as well as the papers of our general sessions. It became necessary to organize a staff through whom this work might be done. It had to find and select men highly trained

in scientific, literary, and business methods, and furnish them with facilities to work. It had to not only finance the printing expenses but it had also to pay a staff, (small salaries it is true) and provide for the many details which a business office demanded.

But, what has been much harder and equally necessary, it has had to direct and encourage its editors and other officials to initiate and develop methods for increasing the membership of the Association as the only means whereby any increased income for its work was possible, and this with a journal of necessity becoming yearly more scientific and technical.

Some will remember that it is but a few years ago when many thought we ought to be so exclusive that even the Commissioner of Health for a whole state was not to be eligible for full membership in the Association until he had served an apprenticeship of three years. Now what has been done? It took a year to drum up our old membership and some 300 had finally to be eliminated from the list. It was not possible for the staff of the JOURNAL before the last annual meeting to get more than organized and to issue the JOURNAL and find its bearings. Since then to a corrected list of *bona fide* members have been added about 400 more, or 50 per cent. Where to find such members and how to obtain them without for a moment lowering the high standards set up, we must ask Professor Gunn, our active Secretary and Managing Editor. From him I learn that during the past three months he has written to or replied to a thousand personal letters, in addition to having signed 2,000 circular letters and weekly, almost, the Committee of Seven have had lists of new members sent on to adjudicate upon.

Much of the office expenditure has been in clerical work for this purpose, and when it has resulted in a direct outcome of \$2,000 added to our finances, most will agree it has been money well spent.

But there was another direction in which the committee felt it must work, and that was to increase in other directions the circulation of the JOURNAL. A year's trial has shown that it was impossible to get large and valuable advertisement without a larger circulation, and through the persistent efforts we have been able to send out to likely subscribers.

And what is the JOURNAL today? 1st. It has enlarged its page and published nearly more than double what it previously did of papers. It has supplied a limited number of editorials to allow the papers of members to be printed, but has had much additional time and labor spent upon publishing a monthly review of the best selected health notes, giving a summary of the up-to-date doings in the world of public health.

2nd. It has given the best literary and editing ability to the JOURNAL, until it more than equals any other of its class here or elsewhere.

3rd. With a very moderate amount for editorial salaries and office staff, we have seen our officers increase the permanent membership over 50 per cent. and our circulation over 150 per cent., giving us a large permanent increase of funds from these two sources. From the reasons indicated the returns from advertisements have not greatly increased; but the results must improve with an enlarged circulation.

But it is apparent that apart from the labor to obtain these results your committee has had to find funds for its officials to work with. The authority given to use the trust funds as a security to bank with has been taken advantage of and the available assets for financing are able to make up what we have drawn against our trust fund that we would be sailing on an even keel.

If we are to keep our membership at \$3 and our JOURNAL at \$2, and if we are to remain over-scrupulous and be purists in the matter of advertisements, our future must depend almost solely upon the enthusiasm and devotion of the apostles and devotees of public medicine, rather than to any rapid increase such as that of the ordinary popular journal. But your committee is well pleased, if not content, with the progress made.

Public medicine is only in its adolescence; ten years ago it was in its childhood. We are both its children and its parents. Shall we exert our best efforts as children to live up to our

opportunities? Shall we as parents accept our responsibilities and sacrifice something for the children upon whom the future lives and happiness of our people in four countries depend? Your committee has decided to call upon all those who are interested and patriotic enough to work for these ends, to build up guarantee funds to make its work easier and to insure success to your JOURNAL.

It is proposed to widen the list through several committees, to take it up actively among the several State, Federal, Municipal and Social Services. Your committee counts upon the support, even at some sacrifice, of members of our Association whose wealth has the public weal and whose devotion has even meant sacrifice.

Respectfully submitted,

PETER H. BRYCE,
Secretary.

Moved and seconded that the reports be approved as read. Carried.
The following papers were then read:

Occupational Diseases and Legislative Remedies. Dr. John B. Andrews, American Association for Labor Legislation, New York City.

Industrial Hygiene, A Neglected Field of Public Health. Dr. C. T. Graham-Rogers, State Department of Factory Inspection, New York City.

Industrial Lead Poisoning. Dr. Alice Hamilton, Hull House, Chicago, Ill.

Good Illumination, An Important Factor in Public Health and Safety. Mr. Clare N. Stannard, Denver, Col.

Modern Methods of Fly Fighting. Dr. E. C. Levy, Chief Health Officer, Richmond, Va.

The Social Survey and Public Health. Mr. Shelby M. Harrison, Department of Surveys and Exhibits, Russell Sage Foundation, New York, N. Y. (Read by title.)

Coöperation and Efficiency in Rural Health Work. Mr. John Ritchie, Jr., Massachusetts Institute of Technology, Boston, Mass. (Read by title.)

Hygiene and Physical Education: A Thesis on the Teaching of Hygiene and the Facilities of Sanitary Inspection in Schools. Eugene C. Howe, Ph.D., Wellesley College, Mass. (Read by title.)

Practical Points in Railway Sanitation. Dr. A. E. Campbell, Health Officer, Illinois Central R. R., Chicago, Ill.

The meeting then adjourned.

SELSKAR M. GUNN,
Secretary,

RUDOLPH HERING,
President.

FIFTH SESSION.

The meeting was called to order at 2 p. m., September 11, the President in the Chair.

The following resolution, passed unanimously by the Section on Vital Statistics and referred to the Executive Committee, which unanimously approved of it, was referred to the Association:

"That, sensible of the ravages wrought by syphilis and gonococcus infections in the health of the community, and deploring the inadequacy of existing facilities for the checking of their dissemination, the American Public Health Association calls upon state, provincial and municipal governments of all the countries here represented: (1) to institute a system of confidential notifications of these diseases to a sanitary authority, where such notification does not already obtain; (2) to conduct a systematic educational campaign for the limitation

of the spread of these diseases; and (3) to make proper provision for the diagnosis and treatment of all cases of syphilis and gonococcus infections not otherwise provided for."

The resolution was unanimously adopted.

The following resolution, passed unanimously by the Section on Vital Statistics and referred to the Executive Committee, which unanimously approved of it, was referred to the Association:

"*Resolved:* That we recommend the enactment of laws prescribing the manner of keeping the morbidity records of all institutions for the care of the sick, and requiring the filing of transcripts of so much of said records as may be necessary for statistical purposes, with the proper registration officials of the several jurisdictions in which such institutions are located."

The resolution was unanimously adopted.

The Secretary presented the following report of a Special Committee appointed by the Executive Committee to consider the question of delegate membership to the Association:

REPORT OF SPECIAL COMMITTEE.

To the Executive Committee of the American Public Health Association:

The Special Committee appointed to consider the suggestion made by Dr. Lee K. Frankel of New York in regard to delegate membership and annual dues respectfully recommend that such steps be taken as may be necessary to amend the constitution and By-laws as follows:

I. Constitution. Amend article III, Section 7, by inserting in line 3, after the words "engaged in" the words "or interested in."

II. By-laws. Amend Chapter 7 of the By-laws by striking out the first paragraph thereof and substituting therefor the following: "The annual fee for an individual member (other than an honorary member who pays no fee and for a delegate member who is chiefly engaged in the conservation and promotion of public health) shall be three dollars (\$3). All such members shall be entitled to receive the papers, reports, and transactions of the Association upon the payment of a subscription price of two dollars (\$2) per annum.

The annual fee for a delegate member, who is not engaged chiefly in the conservation and promotion of public health, shall be not less than twenty-five (\$25) nor more than one hundred (\$100) dollars. Each such member shall be entitled to receive one copy of the papers, reports, and transactions of the Association for each five dollars (\$5) of annual membership fee paid by him.

For the Committee,

HOMER FOLKS,
Chairman.

The Chair announced that the proposed amendment to the Constitution would have to lie over for one year in accordance with the constitution, but that the proposed amendment to the By-laws could be taken up after one day had elapsed.

The following resolution, which was introduced in the Section of Public Health Officials, carried by that section and referred to the Executive Committee, and which had been adopted by that body, was referred to the Association for its approval:

"In consideration of the large amount of time and attention given to the subject of milk standards by the 'Commission on Milk Standards' which was appointed by and financed

by the generosity of the New York Milk Committee and in further consideration of the fact that the commission is made up almost wholly of members of this Association: Therefore be it *resolved*,

"1. That the A. P. H. A. approves of the establishment of uniform milk standards and a classification of milks such as are embodied in the report of the Commission on Milk Standards appointed by the New York Milk Committee and published in the U. S. Public Health Reports August 22, 1913.

"2. That the A. P. H. A. urges the adoption of these standards and classification by municipalities so far as local conditions make them possible."

The resolution was adopted.

The following papers were then read:

The Venereal Problem. Dr. J. H. Landis, Health Officer, Cincinnati, Ohio.

The Relation of the Health Officer to the Venereal Diseases. Dr. Charles F. Bolduan, Department of Health, New York City.

Relationship of Public Health Work to Race Degeneracy. Dr. J. A. Kellogg, Battle Creek, Mich.

Public Health Topics in a College Course on General Biology. Prof. Francis Ramaley, University of Colorado, Boulder, Col.

The Prevention of Typhoid Fever in Rural Districts. Dr. A. W. Freeman, Assistant Commissioner, State Board of Health, Richmond, Va.

What Good Housing Means. Mr. John Ihlder, National Housing Association, New York City. (Read by title.)

An Investigation into the Relationship of Indoor Temperature and Humidity in the Winter to Infant Mortality from Respiratory Diseases. Dr. Donald B. Armstrong, Department of Social Welfare, A. I. C. P., New York City. (Read by title.)

Sanitation in Cuba: Its Progress. Dr. Jorge LeRoy, Havana, Cuba. (Read by title.)

The meeting then adjourned.

SELSKAR M. GUNN,

Secretary,

RUDOLPH HERING,

President.

SIXTH SESSION.

The meeting was called to order at 9 a. m., September 12, Vice-President Batt in the Chair.

The Secretary presented the Report of the Advisory Council:

MEETING OF THE ADVISORY COUNCIL.

The Advisory Council of the American Public Health Association was called to order by the Secretary at 12.40 p. m., Antlers Hotel, September 11, 1913.

Dr. W. R. Batt was nominated and elected chairman, and Dr. Wm. F. Snow as secretary. The following list of officers for 1914 were nominated by ballot for the office stated immediately preceding his name:

For President, Dr. William C. Woodward, Washington, D. C.

For First Vice-President, Dr. John F. Anderson, Washington, D. C.

For Second Vice-President, Dr. Mario Lebreto, Havana, Cuba.

For Third Vice-President, Dr. C. J. Hastings, Toronto, Canada.

For Secretary (to serve for two years), Prof. S. M. Gunn, Boston, Mass. (Treasurer holds over.)

For Executive Committee (each to serve two years), Dr. P. M. Hall, Minneapolis, Minn.; Dr. M. Richardson, Boston, Mass.; and Dr. J. Rankin, Raleigh, N. C.

For Executive Committee to fill unexpired terms of Dr. J. F. Anderson (resigned) and Dr. N. G. McKay (deceased), Mr. Homer Folks, New York, Dr. J. A. Amyot, Toronto, Canada.

Invitations for 1914 meeting were received from Jacksonville, Buffalo, Nashville, Asheville, Denver, Cincinnati, Atlantic City, Philadelphia, St. Paul, New York, St. Louis, Niagara Falls, Charleston, S. C. (California for 1915.)

On ballot it was voted that Jacksonville be recommended to the Association as the place of the 1914 meetings. On motion, this selection was made unanimous.

W. F. SNOW,
Secretary.

WILMER R. BATT,
Chairman.

Moved and seconded that the Secretary be instructed to cast the ballot of the Association for the respective nominees. The motion was carried and the officers were declared elected.

Moved and seconded that the action of the Advisory Council be made the action of the Association so far as the next place of meeting was concerned. Carried.

The Secretary then read the amendment to the By-laws which had been presented to the Association the day before for action. The amendment was as follows:

"II. By-laws. Amend Chapter 7 of the By-laws by striking out the first paragraph thereof and substituting therefor the following: 'The annual fee for an individual member (other than an honorary member who pays no fee) and for a delegate member who is chiefly engaged in the conservation and promotion of public health, shall be three dollars (\$3). All such members shall be entitled to receive the papers, reports, and transactions of the Association upon the payment of the subscription price of two dollars (\$2) per annum.

"The annual fee for a delegate member who is not engaged chiefly in the conservation and promotion of public health shall be not less than twenty-five (\$25) nor more than one hundred (\$100) dollars. Each such member shall be entitled to receive one copy of the papers, reports, and transactions of the Association for each five dollars (\$5) of annual membership fee paid by him."

It was moved and seconded that the By-laws be amended as suggested by the committee. Carried.

Dr. C. L. Wilbur moved the adoption of resolutions relative to the death of Dr. John S. Billings, former President of this Association, and asked leave to draft such resolutions when he had the necessary data available, with the dates and facts concerning his connection with the Association and with the development of some of the work with which this Association is concerned, and that the resolution, when finally prepared, should represent the action of the Association. The motion was seconded and carried.

Dr. G. W. Goler presented a resolution with regard to the Rock Island Line R. R., which was referred to the Executive Committee for action.

The following papers were then read:

The Present Status of Pasteurization. Mr. S. H. Ayers, Bureau of Animal Industry, Washington, D. C.

The Influence of the Financial Stimulus in the Improvement of City Milk Supplies. Prof. H. A. Harding, University of Illinois, Urbana, Ill.

Hindrances to the Extension of Uniform Methods for Vital Statistics in the United States. Dr. Cressy L. Wilbur, Bureau of the Census, Washington, D. C.

Anti-Typhoid Vaccination. Dr. Joseph H. Townsend, Secretary, State Board of Health, Hartford, Conn.

Yellow Fever in Mexico. Dr. Eduardo Liceaga, Superior Board of Health, Mexico City, Mexico.

Cremation *vs.* Earth Burial, from a Sanitary Standpoint. Dr. E. A. Carr, State Board of Health, Lincoln, Neb.

Treatment of a Case of Lupus Vulgaris and Pulmonary Tuberculosis. Dr. William J. Manning, Medical Officer, Government Printing Office, Washington, D. C.

A Recent Contribution by the Federal Government to Health Conservation and Preventive Medicine. Dr. Arthur Reed Perry, U. S. Department of Labor, Washington, D. C. (Read by title.)

The Public School Hygiene Service of Mexico. Dr. Alfonso Pruneda, Mexico City, Mexico. (Read by title.)

Dr. G. W. Sumner moved that Doctor Manning's paper be referred to the Executive Committee with the idea of appointing a committee to investigate and coöperate with Doctor Manning. The motion was carried.

The meeting then adjourned.

SELSKAR M. GUNN,

Secretary.

WILMER R. BATT,

Vice-President.

CLOSING SESSION.

The meeting was called to order at 9 p. m., September 12. In the absence of the President and Vice-Presidents, Dr. W. C. Woodward was elected Chairman for the meeting.

The Executive Committee reported the election of the following gentlemen to the Committee of Seven: Dr. Peter H. Bryce, Ottawa, Canada; Mr. Homer Folks, New York; Dr. Henry D. Holton, Brattleboro, Vt.; Dr. Jesus E. Monjaras, Mexico City.

The Executive Committee also announced the election of the following gentlemen to serve on the Committee on Journal: Dr. H. T. Holton, Dr. Peter H. Bryce and Dr. Gardner T. Swarts, and the election of Prof. S. C. Prescott and Dr. M. W. Richardson to serve on the Membership Committee.

The following resolutions prepared by the Section on Vital Statistics and referred to the Executive Committee and, having been approved of by that body, were referred to the Association:

"WHEREAS the timeliness of vital statistics constitutes one of their greatest assets to sanitation, be it resolved that the Director of the Census of the United States, and the corresponding officers of the other countries represented in this Association, be respectfully requested to make available at the earliest opportunity revised death-rates for the past decade based upon the recent census, of statistics relating to occupational mortality, of other statistical inquiries into the individual causes of mortality, and that a registration area of births be established as an important corollary to the registration area of deaths."

The resolution was adopted.

"Resolved: That the section on Vital Statistics approve the revised Standard Birth Certificate and recommend its adoption wherever practicable by Boards of Health, Registrars and other registration officials."

The resolution was adopted.

"The Model State Law for Morbidity Reports meets with the cordial approval of the members of the Committee on Resolutions of this section; nevertheless, it feels that the support of other kindred organizations would be of great benefit in aiding the adoption of this law by state and possibly provincial boards of health and health officers. Be it therefore *resolved*, That a committee be appointed to coöperate with other interested agencies in the drafting of a Model State Law for Morbidity Reports."

The resolution was adopted.

REPORT OF THE LABORATORY SECTION.

The Laboratory Section begs to announce the election of officers as follows:

Chairman, Prof. Edward Bartow.

Vice-Chairman, Prof. C.-E. A. Winslow.

Recorder, Dr. Allen W. Freeman (2 years).

Secretary, Dr. D. L. Harris, elected last year for two years.

Elected members of Council, Dr. F. P. Gorham, Mr. J. O. Jordan, Dr. G. F. Ruediger, Dr. A. P. Hitchens, Dr. Gordon Bell.

REPORT OF THE SECTION ON VITAL STATISTICS.

The Section on Vital Statistics begs to announce the election of officers as follows:

Chairman, Prof. W. F. Wilcox.

Vice-Chairman, Dr. E. Liceaga.

Secretary, Dr. Louis I. Dublin.

REPORT OF THE SECTION OF PUBLIC HEALTH OFFICIALS.

The Section of Public Health Officials begs to announce the election of officers as follows:

Chairman, Dr. C. V. Chapin.

Vice-Chairman, Dr. C. J. Hastings.

Secretary, Dr. E. C. Levy (held over).

Recorder, Dr. A. S. Fell.

Elected members of Council, Dr. P. M. Hall, Dr. G. H. Sumner, Dr. James Roberts, Dr. Jesus Monjaras, Dr. J. A. Hayne.

Representative in Advisory Council of A. P. H. A., Dr. P. M. Hall.

REPORT OF THE SANITARY ENGINEERING SECTION.

The Sanitary Engineering Section begs to announce the election of officers as follows:

Chairman, Mr. R. S. Weston.

Vice-Chairman, Mr. G. W. Fuller.

Secretary, Dr. H. D. Pease.

Member of Advisory Council, Dr. H. D. Pease.

Elected members of Council, Col. J. L. Ludlow, Mr. Rudolph Hering, Mr. Langdon Pearse, Mr. W. L. Stevenson, Mr. Paul Hansen.

REPORT OF THE SOCIOLOGICAL SECTION.

The Sociological Section begs to announce the election of officers as follows:

Chairman, Mr. Lawrence Veiller.

Vice-Chairman, Dr. H. E. Dearholt.

Secretary, S. Poulterer Morris.

Committee on Plan and Scope, Dr. Lee K. Frankel.

Dr. Peter H. Bryce presented the following resolution:

"That the American Public Health Association desires to express its appreciation of and thanks for the kindness and courtesies extended to it and its many members and those accompanying them, not only to the official bodies who are especially interested in the work of the Association, but also the many private citizens, who have extended them hospitality and opened their homes to the members of the Association and their friends. Amongst those to whom the thanks of the Association are especially due are the Mayor and City Council of Colorado Springs, the Chamber of Commerce, the County Medical Society, the City Board of Health, and especially to its Health Officer, Doctor Gillett, for their untiring efforts to promote the work and entertainment of the Association; to Dr. Rutledge and the Directors of the Modern Woodmen of America for their splendid entertainment; and to the staffs of the newspapers of Colorado Springs and Denver for their unusual and unremitting interest in the work of this Association in the publication of the papers and proceedings of the Association.

The resolution was adopted by a rising vote.

The Association then adjourned.

SELSKAR M. GUNN,
Secretary.

WILLIAM C. WOODWARD,
Chairman.

NEW MEMBERS.

Names of persons elected at the Colorado Springs meeting of the Association or in the interim from the Washington meeting, by action of the Committee of Seven:

Alden, Arthur M., Iowa City, Iowa.
Alsberg, Carl Lucas, Washington, D. C.
Andrews, John B., New York City.
Armstrong, Donald Budd, M. D., New York City.
Arnold, Frank, Johnstown, Pa.
Askew, Edward R., M. D., Hugo, Okla.
Babbitt, H. E., Columbus, Ohio.
Ballenger, T. D., Princeton, N. J.
Begg, Robert B. H., Blacksburg, Va.
Bensel, Walter, M. D., New York City.
Bentley, David Benjamin, M. D., Sarnia, Ont.
Biggs, Hermann B., M. D., New York City.
Bierring, Walter L., M. D., Des Moines, Iowa.
Birdsall, Lewis Isaac, M. D., Minneapolis, Minn.
Blakeslee, Walter H., M. D., Philadelphia Pa.
Boyd, Mark F., M. D., Boston, Mass.

Brown, Hugh A., Washington, D. C.
Brown, Luther A., M. D., Portland, Me.
Browning, Charles C., M. D., South Pasadena, Cal.
Bruckmiller, Frederick W., Lawrence, Kansas.
Bryant, Arthur P., Clinton, Iowa.
Burnett, C. T., M. D., Boulder, Col.
Campbell, Albert E., M. D., Chicago, Ill.
Cannon, Wilbur F., Denver, Col.
Chadsey, Mildred, Cleveland, Ohio.
Chidester, Walter S., Miraflores, C. Z.
Clore, Lex B., Indianapolis, Ind.
Coddington, Edwin H., New Rochelle, N. Y.
Coffin, Theodore, Katonah, N. Y.
Cogswell, William F., M. D., Helena, Mont.
Corwin, R. W., M. D., Pueblo, Col.
Cox, Robert L., New York City.
Crankshaw, Charles W., D. D. S., M. D., Newark, N. J.
Culbertson, Doctor, Dauphin, Manitoba.

- Daniels, Herman P., M. D., Colorado City, Col.
 Davidson, Doctor, Cartwright, Manitoba.
 Davis, E. T., Chicago, Ill.
 Davis, Lewis, -Detroit, Mich.
 DeFree, Robert M., Holland, Mich.
 Dittoe, William Henry, Columbus, Ohio.
 Dungan, Samuel O., Indianapolis, Ind.
 Dutton, Charles E., M. D., Minneapolis, Minn.
 Eaton, Charles A., M. D., Portland, Maine.
 Edgerton, E. Otis, M. D., Arcadia, La.
 Edwards, William H., New York City.
 Edmison, John Henry, M. D., Brandon, Manitoba.
 Edwards, James F., M. D., Pittsburgh, Pa.
 Everhardy, Jacob L., M. D., Leavenworth, Kansas.
 Falk, Ralph, M. D., Boise, Ida.
 Ferguson, Franklin A., M. D., Portland, Maine.
 Fiedler, Otho, M. D., Sheboygan, Wis.
 Fowler, Bertha W., Colorado Springs, Col.
 Fowler, George S., New York City.
 Freas, Raymond, Baltimore, Md.
 Frost, Edward W., Colorado Springs, Col.
 Fuller, James E., Colorado Springs, Col.
 Fritze, Lucius A., Moline, Ill.
 Fuertes, James H., New York City.
 Godfrey, Hollis, Ph. D., Philadelphia, Pa.
 Grant, William, Boston, Mass.
 Greenfield, Myrtle, Lawrence, Kansas.
 Gudeman, Edward, Ph. D., Chicago, Ill.
 Gundrum, Frederick F., M. D., Sacramento, Cal.
 Hamilton, Alice, Chicago, Ill.
 Hamilton, Herbert C., Detroit, Mich.
 Hartloff, Charles Wm., M. D., Evansville, Ind.
 Handford, Peter Oliver, M. D., Colorado Springs, Col.
 Harris, Roland, C., Toronto, Canada.
 Hastings, Edwin George, Madison, Wis.
 Hatfield, Charles J., M. D., Philadelphia, Pa.
 Hayes, Oscar, M. D., Denver, Col.
 Hazlehurst, James N., Atlanta, Ga.
 Hess, Alfred, M. D., New York City.
 Hidy, Klore W., M. D., Indianapolis, Ind.
 Higgins, Lafayette, Des Moines, Iowa.
 Hindman, Sims S., M. D., Milledgeville, Ga.
 Hoad, William C., Ann Arbor, Mich.
 Holden, George W., M. D., Denver, Col.
 Hood, Charles H., Boston, Mass.
 Horton, Sutton, New York City
 Horton, Theodore, Albany, N. Y.
 Hoyt, Robert N., Wellesley, Mass.
 Huckle, Clarence, Washington, D. C.,
 International Health Commission, Washington, D. C.
 Johnson, Ingrid (Miss), Chicago, Ill.
 Jones, William, M. D., Aurora, Ill.
 Kenaston, Hampton Ray, M. D., Bonesteel, S. D.
 Kistler, J. M., M. D., Minneapolis, Minn.
 Klotz, Oskar, Pittsburgh, Pa.
 Kopf, Edwin, W., Newark, N. J.
 Kurk, Fred William, Louisville, Ky.
 Kusel, George C., M. D., Philadelphia, Pa.
 Lathrop, Julia C., Washington, D. C.
 Laughlin, William Raymond, M. D., Chicago, Ill.
 Leake, James P., M. D., Washington, D. C.
 Lee, Richard Edwin, Meadville, Pa.
 LeFeber, John, Milwaukee, Wis.
 Leland, Rasco G., M. D., East Leroy, Mich.
 Looney, Robert N., Prescott, Ariz.
 Lower, Theodore A., M. D., Ottawa, Ont.
 Lyster, Major William J., Washington, D. C.
 McKerrihan, Sample B., Portsmouth, Ohio.
 McKesson, Charles L., Colorado Springs, Col.
 Marcussen, William H., Nichols, N. Y.
 Mason, E. Marvin, M. D., Birmingham, Ala.
 Maurer, Otto, New York City.
 Mercur, William H., M. D., Pittsburgh, Pa.
 Miller, Lucas A., Colorado City, Col.
 Minnick, James, Chicago, Ill.
 Morgan, H. G., M. D., Indianapolis, Ind.
 Morgan, John W., M. D., Denver, Col.
 Moncrieff, John Thomas, M. D., Columbus, Ga.
 Mudge, Courtland C., Providence, R. I.
 Mullooney, John J., M. D., Harrisburg, Pa.
 Murphy, Lyman C., Chicago, Ill.
 Nasbitt, Charles T., M. D., Wilmington, N. C.
 Nicol, Norman C., New York City.
 Noble, Mary R., M. D., Colorado Springs, Col.
 Noland, Lloyd, Birmingham, Ala.
 Norton, George H., Buffalo, N. Y.
 Nuebling, Emil Louis, Reading, Pa.
 Osborne, Frank J., Orange, N. J.

- Owen, Edward B., Merrill, Wis.
 Palizza, Albert P., Providence, R. I.
 Patterson, Francis D., M. D., Philadelphia, Pa.
 Perry, Arthur R., Washington, D. C.
 Persson, Gustof A., M. D., Mt. Clemons, Mich.
 Peters, William H., M. D., Cincinnati, Ohio.
 Peterson, C. Gilbert, New York City.
 Price, George M., M. D., Brooklyn, N. Y. •
 Price, William Henry, M. D., Detroit, Mich.
 Poucher, Frank C., New York City.
 Powers, Luther M., Los Angeles, Cal.
 Quimby, E. Frederick, Ancon, C. Z.
 Ramaley, Francis, Boulder, Col.
 Reeves, Emory W., M. D., Houston Heights, Tex.
 Reinochl, John K., Las Cascadas, C. Z.
 Rettger, Leo F., New Haven, Conn.
 Rich, Edward D., Ann Arbor, Mich.
 Rietz, Paul C., M. D., Evansville, Ind.
 Robinson, George L., New York City.
 Robinson, James E., M. D., Temple, Tex.
 Rockwell, Alvin H., M. D., Kalamazoo, Mich.
 Rogers, Lore A., Washington, D. C.
 Saville, Charles, New York City.
 Sayler, Harley L., M. D., Des Moines, Iowa.
 Schneider, Edward C., Colorado Springs, Col.
 Seabright, John E., Gary, Ind.
 Segard, Christian P., Chicago, Ill.
 Seeman, W. H., M. D., New Orleans, La.
 Schier, Oscar B., Baltimore, Md.
 Schmid, H. Ernest, M. D., White Plains, N. Y.
 Schweitzer, Ada E., M. D., Indianapolis, Ind.
 Singer, William F., M. D., Pueblo, Col.
 Shaw, George H., Brooklyn, N. Y.
 Slaughter, George, Brooklyn, N. Y.
 Slee, Arthur M., Swiftwater, Pa.
 Smith, Ernest E., M. D., New York City.
 Smith, J. Waldo, New York City.
 Spear, Walter E., New York City.
 Spencer, Caroline E., M. D., Colorado Springs, Col.
 Stevenson, Albert Fletcher, Washington, D. C.
 Stone, Murray C., Jefferson City, Mo.
 Sumner, Guildford H., M. D., Des Moines, Iowa.
 Sweet, Albert W., Providence, R. I.
 Talbot, Arthur N., Urbana, Ill.
 Taylor, Joseph E., M. D., Tallahassee, Fla.
 Taylor, Paul E., New York City.
 Tenney, Elmer S., M. D., Manila, P. I.
 Thomas, Arthur H., Haverford, Pa.
 Tinsman, Joseph A., Philadelphia, Pa.
 Tlusty, Anthony, Cedar Rapids, Ia.
 Torrance, Frederick, Ottawa, Can.
 Tully, Edward J., Madison, Wis.
 Van Blarcom, Carolyn C., New York City.
 Waite, Herbert H., Lincoln, Neb.
 Waldo, Richard H., New York City.
 Weldon, Luther J., M. D., Denver, Col.
 White, Benjamin, Brooklyn, N. Y.
 White, Joseph H., Pittsburgh, Pa.
 White, Wm. C., M. D., Pittsburgh, Pa.
 Williams, Sherman, M. D., Denver, Col.
 Wills, F. A., Philadelphia, Pa.
 Wilson, Dunning St., M. D., Louisville, Ky.
 Winslow, Paul V., M. D., Wappingers Falls, N. Y.
 Witmer, Albert F., M. D., Freeport, N. Y.
 Wood, E. M., M. D., Winnipeg, Can.
 Woodworth, Donald W., M. D., Tulsa, Okla.
 Wright, Herbert L., M. D., Hugo, Okla.
 Young, Anna A., M. D., New York City.
 Young, Albion G., M. D., Augusta, Maine.
 Zetek, James, Ancon, C. Z.

HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS.

Brookline, Massachusetts.

Brookline presents a well prepared report for the year ending December 31, 1912.

Following the list of officials and employees of the Board of Health is given the introductory report of the Board as a whole which begins with the financial statement. This is an itemized account under general heads showing appropriations and expenditures for 1912, recommendations for 1913, and a comparison with expenditures for 1910 and 1911. This latter makes the statement of much more interest, as it shows where the increase of expenditures from \$59,741.85 in 1911, to \$69,464.64 in 1912 has been made.

Several pages are given to the revised health regulations of the town, including ordinances under such headings as, communicable diseases, disinfection, waste materials, garbage, foodstuffs, milk, vaults, cesspools, etc. Also a list of the notifiable diseases for both people and animals is printed.

The report of the agent of the Board of Health shows in a concise manner the actual work that has been carried on. The total number of deaths, exclusive of still births and deaths of non-residents, with a population of 30,000 as estimated by the town clerk, gives a mortality of 352, or 11.73 per 1,000 inhabitants. The number of deaths from infectious diseases was comparatively low, although the number of cases of typhoid fever and tuberculosis appears to be somewhat increased.

During the year a free tuberculosis dispensary was established in compliance to the state law, a room in the town hall being used for the purpose. This work was in charge of a doctor and a nurse and their report shows that much good work has been done.

Brookline has done a large amount of work along the lines of mosquito suppression, the results of which are shown by the fact that only four cases of malarial fever were reported during the year 1912. A regular system of sanitary policing, drainage and filling and petrolizing has been carried on. Included also under this same work is the fly suppression, both inspections being carried on jointly. Manure piles were cleaned up; manure pits, garbage receptacles and privy vaults were made fly tight and a large number of stables were provided with fly traps which appeared to be more or less useful. However, there still appears to be much work to be done.

The poorest section of the entire report is that on vital statistics. While full information is given with regard to each death recorded, the information would be much more useful if it were classified according to the international classification. It is to be hoped that a town as progressive along most lines as Brookline is will adopt the best recognized methods of recording vital statistics.

Clinton, Massachusetts.

Among the first to adopt the form of health report recommended by the Committee on Uniform Health Reports appointed by the Massachusetts Association of Boards of

Health is the Board of Health of Clinton, which has recently issued its report for the year 1913, and for the fiscal year ending January 31, 1914. Although Clinton has a

population of only 13,000 its annual report is one of the best in the state and indicates an extremely progressive and efficient force of health workers. The new standard form has been used with good results and is especially interesting as a demonstration of the applicability of the form to the needs of the smaller cities.

The total expenditures for the year, including refuse removal, hospitalization of contagious diseases, and money paid to various tuberculosis sanatoria for the care of cases, amounted to \$5,764.42 or about 54 cents per capita. The death-rate was 12.0 per thousand, the lowest figure among the ten years recorded; the birth-rate, 25.77; and the infant mortality rate, .90 per 1,000

births. The contagious disease situation was apparently good except for a measles epidemic which held over from the previous year. There were only eight cases of typhoid and fifteen of diphtheria with one death from each.

Among the other reports those of the milk inspector, the inspector of provisions and the plumbing inspector are especially creditable, not only in respect to conditions and methods reported but also in the style of report, which should help in educating the public as well as being of interest to other health officers. The reports of vital statistics under the new system present an excellent appearance.

Erie, Pennsylvania.

The Board of Health of the city of Erie, Pa., submit their report for the calendar year 1912. The report may be divided into two main divisions, the first part containing the reports of the president of the Board and the health officer, the last part being given over to statistical tables. The mortality tables in which the International classification is used and the tables showing comparisons for a long series of years are very valuable. Of interest also are the tables showing the relation of cases to deaths for various diseases which are not so often given in reports.

The president's report summarizes the needs of the department for the future while the health officer's report gives the work that has been carried on the past year. Apparently the health officer has had a good deal to contend with. There was an undue amount of communicable disease with an outbreak of diphtheria and one of scarlet fever. The opinion as set forth in this report urging the necessity for placing the the financial standing of the health department on a proper business basis is quite evident. The financial statement is put near the end of the volume and has only five items in it, one of which is a deficit of \$5,279.22. Proper health department work cannot be carried out under such conditions, which as the report says are bordering on bankruptcy for the greater part of the year.

The birth-rate as set forth in the health officer's report, based on an estimated population of 71,000 was 27.72 per 1,000 inhabitants, while the death-rate was 14.62 per 1,000 inhabitants. Of these deaths fully one fourth of all the fatalities are included in the list of preventable diseases.

The health officer ascribes the low death-rate from diphtheria and recovery with few unpleasant sequelæ, to be undoubtedly due to the early use of antitoxin in larger doses than formerly has been the custom. The initial dose used was double that formerly used.

Other sections of this report describe the work being done by the municipal hospital, the question of food supplies and milk inspection. This latter work is carried on by means of dairy inspection supplemented by the Lorenz Dirt Test. The majority of the milk dealers and dairies are classified as having only fair or poor sanitary arrangements. It is apparent that more strenuous means than simply the dumping of condemned milk into the gutters is needed.

On the whole the report is good but there seems to be need of a better organization of the department with a larger working force, which can be separated into various divisions responsible for different parts of the work. There has apparently been a plan set forth for such a reorganization and it is to be hoped that in the near future it may be adopted.

Hornell, New York.

Hornell is a city of only 14,000 population but its report for the year 1913 would put to shame the reports of many a city of 40,000. The city spends only 26 cents per capita through the board of health (three cents of this going for the care of the insane), and its plumbing inspector and sanitary inspector are the most highly salaried employees, but it is very fortunate in having a man with such progressive ideas and evident ability as Dr. J. A. Conway for health officer.

The city, during 1913, had a death-rate of 15.8 (14.8 corrected for non-resident deaths), a birth-rate of 17.3 and an infant mortality rate of 97.9 per thousand births. The chief cause of death under the international system of classification was apoplexy, and senility was second, a possible error in reporting. Of three deaths from typhoid, two were of non-residents. Twenty-six cases of typhoid occurred in the city but eight of these were apparently imported. Tuberculosis shows a mortality of 42.3 per 100,000.

The report of the sanitary inspector shows 5,439 inspections and 614 reinspections made during the year. The visiting nurse reports a total of 2,050 visits made, including 444 visits to the 23 cases of tuberculosis registered with the board of health and as many visits to the homes of school children. A bacteriological laboratory is maintained for aid in diagnosing communicable disease.

Among the recommendations for improvements we find the following: the establishment of a county tuberculosis hospital, better supervision of the milk supply, the abandonment of shallow wells, the elimination of unguarded grade crossings, the installation of a hypochlorite plant for the city water supply, the establishment of a municipal slaughter house, free garbage collection for the poor, the employment of another sanitary inspector and of a full-time school nurse.

The entire report gives evidence of up-to-date ideas in all branches and it may be instructive to other health officers as well as to the citizens of Hornell.

Lancaster, Pennsylvania.

The Board of Health of Lancaster submits its report for the year 1913. Lancaster is a city of about 50,000, and, while no rates are given in the report, it is probable that in 1913 its death-rate was about 14 per 1,000, its birth-rate in the neighborhood of 24 and its infant mortality rate the admirable figure of 75.2.

This report uses the international system of classification of causes of death, a happy relief from the custom so common in the smaller cities of Pennsylvania, namely the use of an ancient and unsatisfactory alphabetical classification. The report shows apoplexy as the chief cause of death, with organic diseases of the heart, tuberculosis, and cancer following in order. The contagious disease situation seems to be well in hand, except for chicken-pox and measles,

which show a high rate of incidence. An interesting note is the suggestion that eight cases of typhoid were caused by bathing in the river below the sewer outlet.

The milk situation in Lancaster has been greatly improved by taking and testing milk samples every two months and publishing the results in the papers. Dairy inspection is also maintained. General improvements recommended include the creation of the office of meat inspector, better control over sanitary conditions in the city markets, power to control the condition of private alleys, and improved methods of street cleaning.

As far as indicating good conditions and efficient work is concerned the report is successful. No financial statement is included.

Newton, Massachusetts.

The Board of Health of the city of Newton, through its chairman, Dr. F. G. Curtis, presents its report for the year ending December 31, 1912. Newton, which has a population of 41,030 (estimated midyear), is one of the residential suburbs of Boston, many of its citizens being employed in Boston. The death-rate per 1,000 inhabitants for 1912 was 12.52, which was somewhat higher than usual due to a number of factors which, however, do not seem to be further explained. The city appears to have been exceptionally free from communicable diseases, due to the good work of the board of health.

Dr. Curtis is strongly against the keeping of children away from school in which a case of communicable disease has occurred for fear of "catching" the disease. He believes that the closing of schools during epidemics lessens the protective work since the children are then not under the care of the school physician and the case in being missed is apt to infect many more children outside.

The city of Newton expended \$25,874.23 during 1912 for health purposes. The work which is being done in return for this expenditure is being well carried out. A close watch is kept on the tuberculosis cases by means of a nurse who spends her time following up new cases and looking after old ones. This nurse also was instructed during the

warm weather to report sick babies and give instruction to mothers.

The control of the milk supply of the city appears to be through inspection of dairies alone, as there is no mention of any bacteriological examination.

The statistical tables, particularly those for vital statistics, are of the highest order. The international classification of deaths is used, there being a table of deaths by cause, sex and age periods, and one by cause, color, sex and month. There is also given a table of births, deaths, stillbirths and persons married, with population and rates per 1,000 for the preceding ten years. Of particular interest is a comparative diagram showing the incidence of diphtheria, scarlet fever, measles and typhoid fever for twenty years. Measles shows the greatest variability, with diphtheria next. They seem to run in waves of high and low incidence of approximately four to five-year periods. Typhoid fever has shown a slight decrease while scarlet fever seems to remain about the same. It is interesting to note that by following this plot, particularly in the case of measles, it would not be a very difficult matter to predict an epidemic.

The report of the city of Newton is to be commended, the work done being of a high order.

DEPARTMENT NOTES.

The Prolongation of Life.

"We commented recently on the increase which has taken place in the mortality at the higher age groups. A consideration of the problem thus presented led Dr. Hermann M. Biggs, more than five years ago, to advocate the regular medical examination of persons over forty-five years of age. Doctor Biggs suggested that when that age was reached an individual should place himself entirely in the hands of a competent medical adviser, consult him at regular intervals, and so learn how to prevent many of the degenerative changes which give rise to this

increased mortality. It is gratifying to observe that his suggestion has borne fruit. Under date of December 30, there is announced the formation of a unique corporation, namely, 'A Life Extension Institute,' the express purpose of which is to perform the services just mentioned and so to lengthen human life by the application of modern science. The method to be used is very simple, and is similar to that which is applied to ordinary machinery, namely, inspection and repairs. After the human machine has been carefully inspected, the individual will be advised to see his family

physician, who will be furnished a full statement of the results of the examination, both physical and laboratory. The institute is fashioned somewhat after the Model Homes Association; that is, it is a philanthropy conducted on a self-supporting basis. It is to charge a small fee for its work, and any receipts above cost, including a reasonable return on capital, will be devoted to extending its public usefulness."

Weekly Bulletin, Department of Health of New York, January 17.

A Coöperative Clean-up.

The secretary of the Society for the Betterment of Housing and Living Conditions in Richmond, Va., writing in the *American City* for March, describes the clean-city campaign which took place in Richmond last spring. The campaign was very successful on account of the coöperation of the mayor, the chief of police, the chief health officer, the chief sanitary inspector, the superintendent of street cleaning, the superintendent of schools, and the secretary of the above-mentioned society, and the assistance of the newspapers and school-children.

There was no extra expense incurred by the city government and \$40 spent on stationery, printing and postage was paid by citizens. The division of the work among the various city departments and the methods of publicity and the valuable help which came from the children are described in some detail in the article, and the "keep-clean" ordinance, which has since been enacted by the council as a result of the inspiration of cleanliness, is quoted in full.

Vital Statistics in North Carolina.

"In some places in North Carolina the undertakers, doctors and midwives are not reporting births and deaths. They do not seem to know that the new vital statistics law means business. In several of the counties the death- and birth-rates, according to the first month's reports, are so low that they are absurd.

"For instance, the returns from Robeson County for January show an annual death-rate of only 3 per 1,000, whereas, from the death-rate elsewhere, it would seem that it should be at least 24 per 1,000. Word

has been sent to all the undertakers, doctors and midwives in Robeson County, and other counties in the same plight, that two weeks will be given them to report all unreported births and deaths, after which a thorough official investigation will be made by the State Board of Health for unreported births and deaths; and that, when such are found, prosecution will be made at once.

"The attorney-general has been consulted on this matter, and he is heartily in accord with the new law. He wants it enforced to the letter. He has asked that all the data for the first half-dozen prosecutions be laid before him, so that he can give them his full attention. After that, he will act as general consultant in such work whenever needed."

Press Bulletin, North Carolina Board of Health.

Chicago's School Dental Dispensaries.

"Chicago, following the lead of New York, Philadelphia, Cincinnati, Detroit, Toronto, and many smaller cities, is now undertaking the care of the teeth, at least in part, of such of its school children as are unable to secure the services of a family dentist on account of the expense involved.

"Three years ago the Public Relations Committee of the Chicago Dental Society provided a volunteer dental inspection service in our public schools under the direction of the supervising dentist of the division of child hygiene of the department of health. They also provided free dental work in three dispensaries equipped by private subscription. In 1912 a Chicago business man and philanthropist generously equipped seven additional dispensaries and has since provided the money to pay ten dental operators. During the year 1913 the dental inspectors examined 26,655 children, finding 24,334 with teeth defects. In the dispensaries there were performed 17,930 fillings, 14,348 extractions and 26,929 treatments.

"The health department appropriation for 1914, for the first time, contains provision for the salaries of operators in ten dental dispensaries."

Bulletin Chicago School of Sanitary Instruction, February 14.

Controlling Measles in the Schools.

"The history of an outbreak of measles in a Darlington school, as recorded by Dr. S. G. Mostyn, M. O. H., in his report for 1912, is worth repeating. Five cases occurred from the 4th to the 9th of October; twenty-six were notified from the 15th to the 24th. During the latter period the children were arranged so that as far as possible the children who had not had the disease were separated from one another by children who had been rendered insusceptible by a previous attack. During the rest of the term only three cases of measles occurred in the school. There were at this time in the school 144 children who were stated not to have had measles, so that the outbreak cannot have come to an end from want of material. Doctor Mostyn adds that during the last term of the year, when a careful record was kept of cases of measles in the schools, 110 cases were notified, but that of these, all but eight were in infant schools, and of the eight, seven were in a school where the conditions are exceptional. This supports the view now generally held, that, in the present conditions, measles does not spread among the elder children in the public elementary schools."

The Medical Officers, February 7.

A Law to Protect Public Morals.

The press service of the North Carolina Board of Health is sending out as a suggestion to law makers of the state the following article:

At a recent meeting of the North Carolina Conference for Social Service it was unanimously voted that a movement should be started to have the next legislature make state-wide the present Guilford County law "for the protection of public morals." The law is briefly explained by Mr. A. W. McAlister as follows:

"1. The enforcement of this law, as in the Stadium case, makes it impossible for a property owner to rent his property for immoral purposes. A recent newspaper article states that in such cases, where the renting for immoral purposes is persisted in, the property is forfeited to the city; but this is an

inaccuracy. It is not forfeited to the city but the owner, besides being subject to the heavy penalties imposed by law, has to give bond that the house will not be used for such purposes within twelve months, and unless he can give acceptable bond, the house is placarded and must remain vacant for a period of twelve months. The enforcement of this law subjects any man who knowingly rents his property for immoral purposes to what amounts to almost confiscation, and, therefore, renders it impossible for him to do it.

"2. It makes it unlawful for any keeper of a house of prostitution to permit any unmarried female under the age of 18 years to remain in such house.

"3. It provides a minute code regulating the dealing in cocaine, opium, and all similar drugs by wholesalers, retailers, doctors, and others.

"4. The statute then provides that the county attorney shall secure from the internal revenue collector the names of all persons who have paid license tax for dealing in intoxicating liquors, and such certified lists are made prima facie evidence that such persons are violating the law against selling intoxicating liquors.

"5. The law also prohibits any from advertising, giving, presenting, or participating in any obscene, indecent, immoral, or impure drama, play, or exhibition, show or entertainment, and provides for the removal of sheriff, police and other officers who fail to perform their duties, for drunkenness, and for other causes rendering them unfit.

"If properly enforced, it ought to be easy to break up gambling, retailing, and the white slave traffic and business in Guilford County, and wherever else it is adopted."

The Common Fork.

After renewing the campaign against the common drinking cup and roller towel the New York City Department of Health is planning to add the free-lunch fork to the prescription list as evidenced in the following clipping from the *Weekly Bulletin* of February 14:

"In this connection it may be stated that the department is also contemplating action

against the use of common forks at the saloon free-lunch counters. Investigation has shown that forks, used by one person in eating, from a common dish, food such as hash, potato salad, sauerkraut, etc., are returned after using to a glass containing some cold water only, to be picked up and used in the same way by succeeding persons. This very personal tool thus comes into more or less intimate contact with the saliva of the mouth and the mucous membrane of the tongue and lips.

"In view of the fact that disease-producing bacteria, some of them a most virulent kind, may be present in secretions of the mouth and throat, it is deemed important to prohibit this common use of such eating utensils. In an examination of the common barroom fork, undertaken sometime ago in Louisville, disease germs were found in thirteen out of sixteen specimens examined. It is suggested that the food at such lunch counters be prepared beforehand in the form of sandwiches, etc., and handed out to the individual, or else each customer be given food on a plate with individual utensils, and that these utensils be thoroughly washed after using."

School Nurses.

The *January Bulletin of the Health Department* of Asheville, N. C., is devoted to a discussion of various phases of school hygiene and contains among other things the following brief discussion of the benefits to be derived from having school nurses:

"The growing realization of the importance of the school nurse in any system of medical inspection received added impetus at the Buffalo meeting. Philadelphia school and health authorities have recently made careful investigations to test the workings of medical inspection with and without the "follow-up" by school nurses. The results showed a real saving in school time and money through nurse service. Not only did the nurse service save the pupil's time that would have been lost in returning to school, but in all instances the number of defects corrected increased with nurse service. This is the day of dollar efficiency, and the school system that can show, not a mere temporary

saving, but permanent economy of operation in fulfilling community needs, educational or otherwise, is rewarded with public support. The advantages of school-nurse service are particularly susceptible to demonstration by the efficiency method. Furthermore, school-nurse service justifies itself on strictly pedagogical grounds: the work of the school nurse is hygiene instruction of the most direct and practical sort, and therefore belongs in the school's field, quite independently of other considerations."

Permanent Public Health Exhibit.

"On Wednesday, December 17, a permanent exhibit, showing the various activities of the department of health, was opened in the exhibition hall on the fifth floor of the Department Building, 148 Centre Street. On this occasion, Dr. Stephen Smith, one of the original organizers of the present department of health, delivered an interesting address describing sanitary conditions in New York City fifty years ago. At that time the death-rate was over 36 per thousand almost treble the present rate. The health authorities had no real power to remedy matters and the work was, moreover, largely dominated by politics. Dr. Stephen Smith was one of the prime movers in the formation of a citizens' committee, which made a very extensive and searching investigation into the sanitary condition of the city and prepared a bill which was finally enacted into law reorganizing the department of health in its present form.

"Doctor Jacobi, another of the speakers, emphasized the enormous improvement which had taken place in the milk supply of the city and heartily endorsed the attitude of the department of health in the matter of the pasteurization of the milk supply.

"Prof. Charles F. Chandler, who was one of the first "pure food" chemists in this country, gave an interesting account of the examination of foods for adulterations and emphasized the distinction between those which were dangerous to the public health and such as were merely commercial frauds but without effect on the public health.

"The retiring general medical officer of the department of health, Dr. Hermann M.

Biggs, sketched the remarkable changes which had taken place in public health methods following the bacteriological discoveries of Pasteur and Koch in the seventies and eighties.

"It is planned to make the exhibit permanent and keep it up to date and make it available to students of public health and others desiring to acquaint themselves with the work of this department."

Weekly Bulletin, Department of Health of New York City, January 3.

Sending Cultures and Specimens by Mail.

Thinking that a statement of the present postal regulations regarding the sending of bacterial cultures and pathological specimens may be of interest, we quote below an article from a recent *Monthly Bulletin* of the California State Board of Health which summarizes the matter in brief form:

"Under the new parcel post regulations it is permitted to send specimens to the laboratory by parcel post. Notification to this effect has been received in the following excerpt from a letter from Mr. C. S. Merrill, postmaster of Berkeley:

"For your information, I quote herewith the section in the new parcel post regulations covering this matter—

"Specimens of dried blood or diseased tissues or communicable diseases, cultures and tubercular sputum may be mailed in accordance with instructions of the Treasury Department (Bureau of Public Health and Marine Hospital Service), as promulgated by the Post Office Department under Order No. 3064, of April 22, 1910."

"It will be necessary, of course, for you to bring your parcels to the post office, in order to determine the zone into which they are to be mailed."

"Order No. 3064, referred to in Postmaster Merrill's letter, prescribes, among other requirements, that cultures of plague and cholera and liquid cultures are not to be admitted to the mails. The order specifies also that specimens shall be sent only in containers which have met certain requirements. The mailing outfits issued by the laboratory have met with the approval of

the post office authorities, and they should be used exclusively in transmitting bacteriological specimens through the mails to this laboratory.

"By applying letter postage, as heretofore, the regular outfits may be mailed at mail boxes.

"Dogs' heads to be examined for rabies, cows' ears to be examined for anthrax, and similar specimens are unmailable and should be sent by express only. The postal regulations are explicit in this regard, and violations are frequently investigated by the postal officials."

Student Visiting Nurses.

The following suggestion in regard to the employment of student nurses as helpers in public health work comes from the January number of *Public Health*, the monthly bulletin of the Michigan Board of Health, and may offer a valuable suggestion to boards where such help is available:

"In your relation to public health administration you will find that among the poor much good is being done by pupils being sent out to give such aid as in their power lies. Besides the benefit to the student nurse coming in touch with the under classes, becoming used to the ways of depravity, inconveniences and lack of accessories which, with the well equipped training schools we do not come in touch as every convenience is offered. This work is both educational and philanthropic and should be more generally followed.

"District nursing may be followed by the pupil visiting nurses and in some quarters, the trained nurses district the city and wait regularly upon such as need assistance, coming in contact with insanitary ways of living and bettering them, and above all, doing much in the way to successfully bring up the public health standard.

"Better results are obtained by specializing, so conceded, whether as physician or nurse. If we give our whole attention to one subject or particular branch of this work, such as tuberculosis, care of babies, milk inspection, visiting the schools, we are soon fitted to be judges of the conditions to be righted and much good is brought about

in this way that is not done without this special nurse."

State Control Local Health Boards.

"In the history of corporations, or institutions, and in public matters we generally find that administration precedes efficiency, that laws tending to the perfection of administrative work take precedence over laws tending to the efficient direction of same, that citizens and the public are more inclined to allow their minds to dwell on generalities than on detail. As a consequence of this psychological fact, boards of health have been appointed as a matter of course, but without due regard to their efficiency. Man is so accustomed to be sick and disabled that through his inability to properly connect cause and effect he has accepted the inevitable without comprehending the reason for unnecessary illnesses and deaths. Then again, the health board being a road for publicity, politicians and those politically inclined have taken advantage of such position in order that they might use it as the first rung of a ladder for ascent to something more remunerative and more agreeable. Others have employed it as a resting-place for easy work and moderate income. Material advances in public health matters have been invariably either through public calamity, a temporary hysteria or excitement brought about by some one calling attention to defects and making demand for improvement, or the slower process of public education and resulting clamor for better conditions. We have in this state, as we have in other states, hundreds of local boards, each governing itself, each mapping out its own policy, and none correlating, so that the unhealthy conditions of one community are not prevented in passing over to another. Disease is not a local condition. Disease processes and dissemination should be considered as a broad matter, demanding at least state control. It is not for us to discuss here governmental control. New Jersey has nearly five hundred boards of health by name. It has scarcely half a dozen that are boards of health by action. The time now is ripe in the public mind and in the professional to bring about the

mighty change of state control and forced efficiency. There is that which tells us that with the coming meeting of the legislature efforts will be made to centralize sanitary authority at Trenton and to make sanitation and disease control compulsory in the different municipalities. The profession is called upon to comprehend the situation and to become interested and use its influence with all its might to further the movement."

Journal of the Medical Society of New Jersey, January 1914.

Health of English School Children.

The London Letter, contained in the *Journal of the American Medical Association* of January 10, contains the following interesting note on school hygiene:

"The annual report, for 1912, of the chief medical officer of the board of education has just been issued. It contains an exhaustive account of the measures which are being taken throughout the country to safeguard the health of school children. Uncleanliness still occupies a large share of the time and energy of the officers of the school medical service, but the returns show a decided and progressive improvement, and the grosser forms of uncleanliness are now rare as compared with the conditions that prevailed when medical inspection was instituted in 1908. There are about six million children in the public elementary schools. About 10 per cent. suffer from serious defects of vision. Among the causes given are heredity, early eye-strain, defective lighting, infectious diseases and neglect in obtaining early medical advice. From 1 to 3 per cent. suffer from defective hearing; from 1 to 3 per cent. have suppurating ears; about 10 per cent. have adenoids, inflamed tonsils or enlarged cervical lymph-nodes requiring surgical treatment; 1 per cent. have ring-worm; 1 per cent. suffer from tuberculosis of readily recognizable form; from 1 to 2 per cent. have heart disease; from 30 to 40 per cent. have unclean heads or bodies, and more than half the children are in need of dental treatment.

"In five directions school hygiene has undergone evolution. There has been a steady

improvement in the routine work of medical inspection, and ancillary undertakings. There is less 'leakage,' more following-up and more accurate clinical examination. Secondly, there is fuller differentiation of abnormal children, and a tendency on the part of authorities to modify the school curriculum in their behalf. Much time and labor are now being devoted to mentally defective, tuberculous, stammering, and frail or retarded children. Thirdly, there has been an enlargement of the conception of the sphere of influence of the school medical officers. Education authorities are finding that, though they have been appointed in the first place merely to inspect children, they may fill a very useful place in the educational system. Fourthly, there has been a marked advance in respect of medical treatment both in quality and in quantity. Lastly, the intimate relation between school hygiene and education is becoming recognized and its application understood. The equipment of the school, the character of the teacher, the importance of physical exercise and manual work, the relation of the leaving child to the national insurance system, to industrial employment, to further education in secondary schools, and to its own home life, are now receiving attention. Thus the school medical work and the issues arising therefrom are beginning to form an integral part of our educational system."

Commission to Study Chicago's Sanitary District.

"Realizing that the Chicago main drainage canal is fast reaching the limit of its capacity, the Chicago Real Estate Board proposes to bring three outside experts, having no preconceived ideas in the sanitary problems of Chicago, to define anew the policy to be followed by the Sanitary District.

"The sum of \$10,000 has been placed at the disposal of the Committee on Harbor and River Improvement of the Real Estate Board by private subscription, as the members of the committee, of which John W. Alvord is the engineer member, believe that a review of the sanitary situation and a study and report would be of the utmost

value to the city at the present time. For this purpose it is planned to coöperate with the Sanitary District, so that the experts may quickly learn of the local situation through such data, statistics, maps and analyses as have already been collected.

"Future of Sanitary Policy.

"Twelve problems were suggested as necessary to outline the future sanitary policy. Briefly, they relate to the dilution factor, with and without separation of trade waters and solids; to the degree of sewage treatment necessary; to the number and location of plants; to the question of extending branch dilution channels in place of interceptors; to the sanitary limits of dumping in the lake; to the problem of abating local nuisances in the three branches of the Chicago River; to the handling of the trade wastes; to the necessary plant, time and cost of its construction, should the dilution water be limited to 10,000 sec.-ft.; to what extent should reliance be had for a pure-water supply upon the preventing of accidental pollution of the lake by steamships, or from the deposit of dredgings, and when should reliance be had on the purification of the water supplies by filtration, sterilization, or other purification methods; to the possibility of contamination from future lakefront harbors and the necessary preventive measures to be adopted."

The Engineering Record, February 28.

Public Health Publicity in New York.

Commissioner Goldwater of the Health Department of New York City has, since the issue of March 4, been sending the *Weekly Bulletin* of the Health Department to 10,000 people, including every physician in the city.

"Formerly only 2,000 copies of the report were printed. The health department had asked for an increased circulation in 1912, but an adverse interpretation of the city charter blocked the way. In 1914, common sense prevailed, and the health department is now permitted to send out 10,000 copies of its bulletin."

"Commencing this year, the health bulletin will contain uniform quarterly reports on health activities. Each table is carefully

prepared to show in the clearest possible manner the lessons of each tabulation. These tables will be repeated each quarter in the same form, allowing easy comparison with previous statistics.

With the issue of February 7, the health bulletin began the regular publication of prosecutions for violation of the sanitary code with the names of the offending persons. The public can now keep an eye on the dirty food dealers and drive them out of business."

"The health department realizes the value of publicity as an educative force of the first magnitude. It proposes, provided funds can be found, to very greatly extend this part of its work and to carry on an intensive campaign of education by means of its weekly and monthly bulletins and also a more popular bulletin designed particularly for the 'man in the street.' The department also proposes to greatly extend its exhibits and public health lectures and is looking into moving pictures as a means of health education."

Examinations for Hook-Worm Ova.

The February 20 issue of *Public Health Reports* describes the technique for the examination of feces for hook-worm ova and for making permanent mounts of specimens:

1. Agitate about 0.5 gram of feces with 5 or 6 cubic centimeters of water in a small test tube. The centrifuge tube is suitable.

2. Strain through two layers of gauze to remove the two consistent particles of feces, and wash the residue with a sufficient quantity of water so that the total filtrate will properly fill a centrifuge tube.

3. To the tube of filtrate add and diffuse therein 5 drops of a 1 per cent. solution of "Toluidinblau" in a 2 per cent. aqueous solution of carbolic acid.

4. Centrifugate sufficiently, two minutes.

5. Decant all supernatant fluid.

6. Place two oeses of the sediment on a slide and spread by gentle pressure with a cover glass.

7. Magnify 105 times in a subdued light (oc. 4, ob. 3 Leitz).

The dye imparts blue and purple tints to the fecal material and a light-brown tint to the eggshells. This polychromatic effect

greatly facilitates the locating of the eggs, which are then magnified 370 and 1,000 times for the purpose of more definite identification of the blastomeres (oc. 1, ob. 7, and oc. 3, ob. 1-12 oil Leitz).

These stained specimens may be satisfactorily mounted by rimping with melted paraffin. In such mounts the complete development of the egg, including the first embryonic stage, may be watched. As the egg becomes mature and the shell disintegrates, the embryo, whether dead or alive, takes on a purple color, as the result of coming in contact with the small quantity of unattached stain present in the mount. As long as the eggshell remains intact its color is light brown, but as soon as it permits the unattached dye to come in contact with the contained embryo the color of the egg changes, so that instead of a light-brown egg there is a purple egg.

In some instances the embryos entirely escape from their eggshells and lie free in the field, but dead, having taken a beautiful purple color. In others they remain coiled up dead in the eggshells. This change increases the value of permanent mounts, as some of the eggs may remain brown, while others show the embryos stained purple. It is necessary to avoid pressure on these mounts, as the embryos are very fragile, and the movement of the surrounding air bubbles is likely to cause fracture and displacement.

The Carrier Question in England.

That the movement to consider the possibility of isolating diphtheria carriers, as well as actual cases, is spreading to England is made evident by the following quotation from *The Medical Officer* of February 28:

"An experimental swabbing of a number of indiscriminately selected children in various Coventry schools last year proved that a considerable percentage of them were 'carriers.' Dr. E. H. Snell, M. O. H., writes in this connection: 'The futility of attempting to "isolate" diphtheria patients unless at the same time steps are taken to deal similarly with the "carriers" is obvious. Whether this is a practicable problem is uncertain. It is certain that at the present time no legal powers are possessed enabling

a local authority compulsorily to isolate them until free from infection. Until means are devised for adequately dealing with this matter, it is probable that the policy hitherto adopted by the Coventry council—which was perhaps in the first instance merely of the *laissez faire* order—of not providing indiscriminately isolation accommodation for this disease, may be justified by the logic of the position.' Doctor Snell adds that apart from the general question of the isolation of all possible cases, some, those in which the larynx is affected, may urgently require the operation of tracheotomy; hospital accommodation for such is often requisite."

Examination Notices.

An examination for the position of food inspector for the city of Savannah, Ga., will be held on Tuesday, June 9, 1914, under the supervision of Dr. G. B. Young, health commissioner for the city of Chicago, Ill., under the supervision of Prof. M. J. Rosenau, Harvard University, Cambridge, Mass., under the supervision of Surgeon-General Rupert Blue, U. S., Public Health Service, Washington, D. C., and under the supervision of the Board of Examiners, City Hall, Savannah, Ga. Further information can be obtained from those in charge of the examination at the cities above mentioned, or from W. F. Brunner, M.D., recorder, Board of Examiners, City Hall, Savannah, Ga.

The term of office will be three years—beyond political interference; salary, two thousand (2,000) dollars per annum; the examination to cover pathological and Bacteriological Veterinary Medicine and meat and other food inspection. The examination is to be identical at all places of examination.

Efficiency among Policemen.

In the March edition of the *American City* Henry Bruère, city chamberlain of New York, suggests that the police in a large city should not be content with merely preventing lawlessness but should spend his spare time in striking at the fundamental roots of crime and become a public welfare worker in the popular sense of the term. Another

line in which the police might be of service is in connection with the health department. Here a great amount of energy and money is spent in the control of nuisances which is a police, rather than a sanitary matter in most instances. The employment of men who are competent to care for public welfare and decency would certainly be a step toward greater total efficiency even though increased salaries might be required to obtain such men.

We quote below a portion of Mr. Bruère's remarks:

"The police should be regarded, in every American city, as the best asset of a vigorous, good citizenship, and not as its chief problem. We need new ideals of police work.

"The city of New York employs 10,000 men to protect its life and property and to deal with conditions which are intolerable in a civilized community. Instead of acting as mere watchmen to guard against lawlessness, the police should be expected to observe and report upon every condition in their neighborhoods concerning which the city should take some form of action. They should be the eyes, ears, and feeling fingers of the city government, to learn where conditions exist about which the city should do something to reduce crime and to minimize unfortunate conditions which lead people to crime.

"No policeman would ever have an excuse for idling on post or for gossiping with other policemen, if he were expected to observe specific things in the neighborhood and to report upon them intelligently, and if from experience he found that action was taken on the basis of his reports.

"I would go so far as to urge that the police be made the chief welfare workers of the city's government, and that they be paid whatever salary may be necessary to enable the city to command the services of men who can understand and interpret its social needs. Who has a better opportunity for gathering the actual facts regarding the conditions in the city than the policemen?

"It would be foolish to say that the present-day policeman is useless, but it can hardly be denied that he is not used comprehensively enough. Give him program

support, encouragement, training, point of view and leadership—and more compensation if need be—and you will make the position of the policeman one of the most important, highly respected, and useful positions in public service.”

Water Borne Disease in Children.

A recent number of the *New York Medical Journal* reviews briefly, as follows, an article from the *American Journal of Tropical Diseases and Preventive Medicine* of January:

“A. J. McLaughlin, in an investigation of the effect of sewage pollution of water on infant mortality, found that gross pollution usually coincides with an excessive infant mortality, which is especially high in the winter and spring. While it is often impossible and always difficult to convince adults

that certain simple hygienic measures will prevent disease, the receptive mind of the child quickly accepts principles and eagerly applies them, and children should be taught in school both the fundamentals of personal and family hygiene, and the fact that it is their right to demand from the municipalities safe water, which must, furthermore, be subjected daily to bacteriological examination. Two primary facts should be taught in regard to food infections: 1, contamination of food or drink with the fingers may be equivalent to homicide; and, 2, that such results can be avoided by careful cleansing of hands and nails after using the toilet and before handling food and drink. Such instruction would reduce the incidence not only of typhoid fever, but also of bacillary dysentery and the conditions commonly grouped as diarrhœ and enteritis of children.”

PERSONAL NOTES

The following persons were elected to membership in the American Public Health Association, April 9, 1914:—

August Vincent Graf,
Benjamin Jurist,
Charles H. LaWall,
R. H. McGinnis, M. D.,

Frederick William Schwartz
Elton David Walker,
Carlos Everette Warriner.

PUBLIC HEALTH NOTES.

School Ventilation.

Dr. J. B. Todd of Rochester reports in the February 28 number of the *New York Medical Journal* some experiments which he has been conducting on an improved system of school ventilation. After some investigation of the dust content of school air where the fan system of ventilation was used he evolved the system described below:

"The fresh air schoolrooms are rooms in which the lower sash is raised in four or five windows, and the opening fitted with a wood frame covered with medium weight unbleached sheeting. The room in which the experiment was first tried had five 36- by 40-inch windows facing the east. Steam pipes extended across the room under the windows, and a hot air inlet, 30 by 30 inches, was on the north side, midway from the floor to the ceiling with an exit opening of the same size, near the floor. In the morning before school opened, the room would be warmed by hot air driven by a fan. When school began this hot air inlet would be closed and all the windows opened, so that there would be fifty square feet of open window space covered with the screen. The cold fresh air would diffuse slowly into the room and would be met by the hot air rising from the steam pipes, so that there were no perceptible drafts. Children sitting within four feet of the open windows all the winter days experienced no inconvenience whatsoever. The temperature of the room was maintained at 68° to 70° F. as easily as before the screens were used. There are two reasons for this: first, glass is a great conductor of heat and cools the bad air in a room very rapidly while cotton conducts only one twentieth as much heat; second, if the air is being slowly diffused into the room, there can be no heat loss from radiation or conduction through the screens, and as it takes no more heat units from the steam pipes under the windows to raise the temperature of the air being slowly diffused into the rooms than it would to heat the same air by the heating coils in the fan room, the use

of the screens is a clear gain of the heat loss by radiation through the glass of the windows. Another economy obtained from the use of the screens is the saving of power and attendance.

"After the screens were installed in this room, no more cases of fainting occurred, hacking, coughing, and restlessness disappeared, discipline was easier to maintain, and the children did better work. The windows were up during all kinds of weather; the coldest day of the winter the thermometer was at zero at 10 a.m. while it was at 70° F. with fifty square feet of screened opening in use.

"One would think that by filling the lower sash of all the windows in a schoolroom with cloth screens, the proper lighting would be decreased, but, instead, the lighting is really improved. The light rays are broken up by the cloth, and a soft diffused light results which is more comfortable to work by than the glaring direct light that comes through glass.

The fresh air rooms are absolutely free from odors, which are so closely associated in our minds with schoolrooms and institutions. Even the smell of stuffiness which can hardly be called an odor is entirely absent. It is, as one teacher has described the air conditions, 'like a continued day in June.'

"Wire gauze and cheese cloth window screens have been used a great many years, but they have proved unsatisfactory in cold weather because they produced cold drafts. For the proper ventilation of sleeping rooms during the shut in months of the year, the cloth screens are of the utmost value. The air is sweet and clean, and one awakes in the morning, vigorous with renewed energy.

"Next to the confined stuffy bad air in schoolrooms, the dust in the air produces the most insanitary condition. In ordinary fan ventilated schools the dust that is brought into the room gradually accumulates, the room acting as a settling tank, while only a small portion is carried out by the vent. I have found in the screened fresh air rooms,

that this dust is entirely eliminated. This dust elimination is accomplished in two ways. First, the fan inlet being closed, no dust is brought into the room by the fan; second, the air that is diffused into the rooms through the screens is *filtered air*, and dust free. The cloth on the screens becomes discolored very much after a time and should be changed for new cloth. I have worked out a form of screen in which the cloth can be changed with little trouble.

"The fresh air screens are admirably adapted to improve the air conditions in sickrooms, hospitals, libraries, gymnasiums, factories, and shops, and their universal use would be of the utmost value in the prevention of tuberculosis and the long list of other diseases that have their incidence associated with ill ventilated places."

Sewage and Garbage.

The rapidly increasing density of population in the United States makes the study of sewage and garbage disposal a matter of the first consequence. An interesting contribution to this study has been made by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce, and has been issued in pamphlet form under the title of *Scientific Sewage and Garbage Disposal*. The pamphlet gives summaries of a series of consular reports concerning the practice followed in those European cities of 50,000 population and upward, which make some attempt at sewage purification; this excludes nearly all the municipalities of southern and eastern Europe. No reports were asked for from London, Berlin, and Paris. Physicians and sanitarians interested in the subject should apply to the United States Department of Commerce for this interesting and informing monograph.

Sexual Disease and the Individual.

Under the above title the *Journal of State Medicine* begins in its March number a series of articles by A. Corbett-Smith which will include all the latest statistics and information on the subject of venereal disease. The series will be republished in volume form at an early date and will consist of two editions, one a complete reprint and the other an abridged form.

We quote below the summary of the first article of the services.

"For reasons already indicated I have dwelt in considerable detail upon this subdivision of sexual diseases; and yet I cannot but feel that 'the half is not yet told.' But at least we have sufficient data from which to draw some definite conclusions and a summary:

"(1) That gonorrhœa, though comparatively ignored as a disease by the medical profession and by the public generally, is in reality one of the most prevalent of all diseases, if not actually the dominant disease of the human race.

"(2) That in comparison with the incidence of syphilis, gonorrhœa is probably four times as prevalent.

"(3) That it forms one of the most potent causes of sterility in women, and is accountable for a large proportion of the major surgical operations performed on women.

"(4) That gonorrhœa forms the direct cause of ophthalmia neonatorum, and so of more than 10 per cent. of all cases of blindness; of more than one third of the blindness affecting inmates of schools and asylums below the ages of 16 to 18 years.

"(5) That if submitted to adequate treatment in its initial stages gonorrhœa constitutes only a mild affection, at least in the majority of cases.

"(6) That through inadequacy of treatment, or similar causations, it has a strong tendency to become chronic, involving various more or less serious complications.

"(7) That in some cases, happily comparatively rare, the disease itself, or its remains, becomes the most serious affection and one capable of the gravest terminations, even of death.

"*The solution of the problem lies in the Education of the Individual.*"

School Visiting Nurses.

An interesting article in the March issue of PUBLIC HEALTH describes the Southampton school clinic which has recently been "established for the purpose of dealing with teeth, eyes, nose and throat, and skin diseases," and which is also extending the possibility of thorough physical examination

of school children where full examination has been impossible in the routine inspection. The article describes the equipment and general system of operation and in addition outlines the duties of the "school nurse" from which we quote the following:

"The duties performed in the outdoor visiting are as follows:

"(1) Visiting each school soon after the medical inspector has completed his inspection of that school and preparing lists of all children found to require attention. Separate lists are prepared for each department (boys, girls and infants) of a school and on each list there is a space for each of the following items: name, age, address, school, defect discovered, advice given by medical inspector, attention received; if no attention received, why not? financial position of parents; home conditions.

"(2) Visiting the homes of children in the aforementioned lists and filling up the report. Such report forms the basis from which the medical officer of health prepares the work for the clinic. Whilst visiting the homes, unsatisfactory conditions are noted and reported. For example: defective closets, blocked drains, damp rooms, etc., are reported to the sanitary inspectors' department. Cases of extreme poverty are referred to the Charity Organization Society and other charities, or advised how to obtain parish relief. Hospital letters are obtained for others.

"If parents can afford private medical attention the nurse encourages them to obtain it.

"(3) Visiting homes of children under treatment and assisting in carrying out any home treatment advised, *i. e.*, syringing ears, nose breathing exercises, rectal enemata for thread worms, treatment of ringworm, scabies, etc.

"(4) Urging treatment in all cases which cannot be treated at the clinic.

"(5) Visiting cases referred by school attendance officers, teachers, officers of the health department and others.

"(6) Giving lectures at schools on the simple rules of health."

Tuberculous Cattle in Holland.

We clip from the *Medical Officer* of February 7, the following interesting note on the method used by the Dutch government in dealing with tuberculosis in cattle:

"Doctor Howarth, the medical officer of health for the city of London, in a report to the corporation, refers to an organized effort to control tuberculosis among cattle which is being made by the Dutch government. The system, he says, has changed recently. Formerly any farmer could go to the government and say: 'Here is a tuberculous cow; I am prepared to have it condemned, and will accept compensation.' This led to no permanent good result. Now farmers are required to enter into an arrangement with the government. The initiative comes from the farmer, who asks that his farm shall be brought under the regulations. The stock on the farm is examined, and clinically recognized cases of tuberculosis are removed and slaughtered, compensation being paid. Recognition of tuberculosis is a reason for isolation, but not necessarily for slaughter. Young stock are kept from the older animals until two years old. Calves are fed on sterilized milk. When two years old these younger animals are tested with tuberculin, and, if healthy, are placed with the older healthy cattle. This is a less expensive method of dealing with the disease than the slaughter of all animals reacting to tuberculin, and it is expected that this slower process will result in the gradual creation of healthy herds. The farms housing these cattle are kept under observation by government inspectors, and the contract is cancelled if the farmer does not follow the regulations. The penalty to which he is exposed, after cancellation of the contract, is that he may be required to repay the cost of the examinations and injections during the time the contract has been in vogue, but no return is necessary for any compensation paid."

Fighting Unventilated Theaters.

Finding that, in the sudden rise in public favor of the "movies," many theaters were being constructed and used with a system

of ventilation which was hopelessly inadequate; the Chicago department of health has undertaken a fight to drive the offenders not of business. It was found impossible to force a standard of ventilation on the theater owners and to close theaters which did not conform to it, but another way was found which has given excellent results.

All theaters which were found to come up to the requirements of the department were given a certificate of proper ventilation which was displayed in the thicket window by the proprietors who realized the advantage of such a certificate and were glad to have it. Those which were poorly ventilated were advised to improve and were promised a certificate when the standards of ventilation were fulfilled. According to the February 14 issue of the *Bulletin of the Chicago School of Sanitary Instruction* the proprietors of the unventilated theaters are already complaining of "poor business" and many are making the improvements which will result in the patronage bringing certificate. We quote the following figures from the *Bulletin*:

"The theater ventilation situation moves slowly, but it moves. December 31 there were 409 unventilated theaters and theaters partially ventilated, but not complying with the ordinance. January 31 the number had fallen to 393.

"December 31 there were 175 fully complying; January 31 there were 202.

"In addition, there are 16 new houses being built to comply, and 43 old houses undergoing alteration to make them comply.

"In other words, in a very short time there will be 261 theaters fully complying. This will be a gain of 60 in the past three months. Moreover, 4 have been closed by the department, and 36 have closed voluntarily. Thus, there are 60 more good ones and 40 fewer bad ones—a gain of 100."

Maternity Benefit in France.

The *Medical Officer* of February 14 prints an interesting summary of the regulations of the maternity benefit in France which we quote below:

"Under a new law which came into force on January 1 last in France, mothers can claim a maternity benefit amounting to one

or two francs a day for so long as the advisers of the local authority consider desirable. At the request of the Minister for Internal Affairs, the Académie de Médecine has drawn up a leaflet for the instruction of women who wish to claim the benefit. The directions set out that grants will be made on a medical certificate mentioning the expected date of labor. After the confinement it is ordered that the mother must keep her bed for ten days, suckle her child, abstain from alcoholic drinks and fatiguing household labor, and particularly from the use of the sewing machine. She must daily give the necessary attention to the child's entire body, particularly the eyes; she must not lay it on its back, but alternately on one side or the other; the breast must be given every two hours; and the medical man must be summoned on the appearance of the least trouble. Persistent disregard of these instructions in spite of the advice of the medical man, must be reported to the mayor, who will stop the benefit."

Pasteurized Milk for Babies.

During the period between April 24, 1911, and October 17, 1913, eight baby milk stations were maintained by Mr. George M. Oyster, Jr., in different sections of Washington, D. C., for a longer or shorter period for the purpose of dispensing milk or modifications of milk to the babies of the poor and the report of the experiment has just been published in pamphlet form by Mr. Ivan C. Weld. From this pamphlet we clip the following:

"About twenty physicians coöperated with Mr. Oyster to the extent of giving their time and services at the stations for the frequent examination of babies. They also prescribed the milk or modifications of milk to be given each baby.

"During the first year and a half, from two to four graduate nurses, selected by an advisory board of physicians, were employed by Mr. Oyster, and spent their entire time in visiting and instructing the babies' caretakers in their homes, recording facts regarding home and family conditions, weighing and observing the progress of the babies, and dispensing the prescribed milk at the stations. During the remainder of the period above

referred to, this part of the work was carried on, in coöperation with Mr. Oyster, by the Instructive Visiting Nurse Society. In all, about fifteen nurses participated in the work, and each nurse submitted a report regarding the babies under her personal observation. The nurses' reports also included reasons for bottle feeding, age, weight, and condition of babies when admitted to the stations, and the milk or milk modification prescribed by the physicians."

* * * * *

"In the raw milk group, which included 351 babies for whom raw milk exclusively was prescribed, we find the average net gain per day, per baby, to be .4030 ounces.

"In the pasteurized milk group, which included 557 babies for whom pasteurized milk exclusively was prescribed, we find the the average net gain per day, per baby, to be .4077 ounces—the average difference in favor of pasteurized milk amounting to .0047 of an ounce per day, per baby.

"As previously stated, the physicians prescribed both pasteurized and raw milk for 110 babies during one or more periods. It will be observed that in this group the same baby received both the raw and the pasteurized milk at different periods as the physicians prescribed, and also that the babies were subject to the same home influences and under the observation and care of the same physicians and nurses and caretakers during both feeding periods. *The average net gain per day, per baby, for the 110 babies in this group when fed on raw milk was .4312 ounces. The average net gain per day per baby, for the same 110 babies when fed on pasteurized milk was .4607 ounces—the average difference in favor of pasteurized milk amounting to .0295 of an ounce, per day, per baby.*

"Conclusions.

"(1.) The slightly greater rate of gain in weight made by babies when given pasteurized milk may possibly be attributed to the destruction of certain possible disturbing elements which, if present in milk not perfectly pasteurized, may tend to retard digestion or prevent the fullest possible assimilation of the milk.

"(2.) The actual difference in rate of increase in weight of the babies would seem to

be convincing evidence that *proper* pasteurization does not impair the digestibility of milk or cause any possible injury to the nutritive properties of milk that can be detected even when used for infant feeding.

"(3) The decidedly greater rate of increase in weight of the 110 babies when fed on pasteurized milk, over the rate of increase of the same babies when fed on raw milk, would seem to be corroborative and conclusive evidence that no possible injury to the nutritive properties of milk actually takes place as a result of modern *scientific* pasteurization and that even the best supplies of raw milk may, at times, be improved by such a process."

Malaria in America.

"Several statements in a paper by Dr. Malcolm Watson on the Prevention of Malaria in the *Glasgow Medical Journal* for February are of special interest to American readers. Doctor Watson, who is one of the best-known investigators of the mosquito-borne infections, was specially interested in what he saw in Panama. 'There the Americans,' he says, 'have certainly developed the finest sanitary organization the world has ever seen. . . . It is a magnificent work, and I shall always regard it as one of my privileges that I saw the Panama sanitary commission at work, and met the men who composed the department.'

"Of great importance is Doctor Watson's theory concerning the freedom from malaria in Barbados, unique among the West Indian Islands in this respect. Its freedom has been attributed to the presence of 'millions,' small minnows which are supposed to eat all the larvæ. Doctor Watson states that this supposition is entirely wrong and the real explanation is that Barbados is composed of a coral chalk, so pervious to water that no surface pools exist. The island is, therefore, sub-soil drained and the so-called rivers are nothing but dry channels. As the Barbados minnows are being exported in large quantities with the idea of redeeming other countries from malaria, Doctor Watson's explanation demands immediate and wide publicity."

N. Y. Medical Journal, February 28.

Educational Lectures on Municipal Hygiene.

"Most of the leading educational agencies of the present day recognize the value of the personally delivered message as a means of educating and influencing public opinion. The editorial, the pamphlet, the cartoon and the exhibit have a definite worth, but none of them seems to compare in effectiveness with the spoken message of an authoritative speaker. Some form of speakers' bureau is a recognized part of all successful educational campaigns. The department of social development of the Brooklyn Bureau of Charities has organized a speakers' bureau to supply lecturers on municipal problems. A directory of the men available shows a large number of well-known and recognized authorities on such subjects as women's wages, industrial accidents, old-age insurance, child labor, housing, disease prevention, foods and drugs, preventive medicine, outdoor recreation, causes of crime and vice, liquor problems, care of the insane and feeble-minded, city beautification, immigration, etc. These subjects are to be discussed from the special point of view of the New York citizen rather than in a general way. Such an educational campaign is characteristic of present-day ideas and ideals of social progress, and cannot fail to have a beneficial effect on social conditions.

Journal of the American Medical Association, February 21.

Running Out the Quacks.

"Quack doctors are the most vulnerable of big game. How astonishingly tender their commercial susceptibilities are has been shown by the *Chicago Tribune*. One week of exposure through the *Tribune's* columns practically ruined every venereal disease quack in the city. Some shut up shop and disappeared. Others sat idle in empty offices, forlorn spiders at the center of flyless webs. Never before was so powerful and profitable an industry brought to such instant wreckage. What destroyed this pirate trade was not alone the direct result of the exposures, definite and potent though that was. The lethal blow was the eviction of all this class of advertising from the daily

press. Within four days of the *Tribune's* declaration of war every morning and afternoon paper in the city, whether printed in English or in some other language (and there is a great number of Chicago newspapers published in foreign tongues), which was carrying this class of copy had been shamed or alarmed into throwing it out. The evening paper of William R. Hearst, who a year ago bragged mightily of having foregone his alliance with quacks, was forced to exclude advertising which represents in the neighborhood of \$70,000 a year blood money to that apostle of journalistic purity. Finally, the militant *Tribune* gives notice of its intention to stir up prosecutions under the law; or, if the present law be inadequate, to agitate for the enactment of a stronger statute under which the malefactors may be brought to book. In view of this newspaper's established reputation for carrying out whatever it undertakes to the fullest conclusion, it is a fairly safe prophecy that in Chicago the venereal quackery game is up. Out in Seattle the *Sun*, a lusty infant of far western journalism, performed a like service for its city; and some years ago the *Cleveland Press* made a valiant but only partly successful effort in that vicinity. But the Chicago campaign has been by far the broadest and most significant. On its letterhead the *Tribune* terms itself 'The World's Greatest Newspaper.' To our mind its anti-quack victory goes far toward making the boast good."—*Collier's*.

Screening as an Anti-Malaria Measure.

The *Tropical Diseases Bulletin* of February 14 reviews a portion of the Proceedings of the Canal Zone Medical Association which discusses the value of screened dwellings in malarial regions. We quote a part of the review as follows:

"(1) The employees residing in screened barracks are not allowed to remain in the barracks unless they bear a physician's certificate; this results in every case of malaria being seen by him. The employees in unscreened barracks are not so controlled, and consequently many cases of malaria amongst them are missed.

"(2) The proximity of the unscreened

settlement with its large number of malaria carriers furnishes a number of infected Anopheles, these affecting to some extent the employees residing in the screened quarters who quite frequently spend their evenings in New Gatun.

"The paper concludes with a few maxims regarding screening, which are given in full.

"1. Screening to be effective must be thorough.

"2. A screened dwelling with defects in the screening (ill-fitting doors etc.) is probably worse than an unscreened dwelling, for in such a house, mosquitoes though readily finding an entrance, once having entered, will not leave.

"3. The wire gauze screening must have a sufficient number of strands per square inch to ensure the impossibility of mosquitoes entering. Eighteen mesh gauze is used in the Canal Zone, and is effective.

"4. The screening must be tight, this will prolong its life.

"5. All doors should open outward, and should be provided with an efficient closing device, and should be hung so that they will not warp or sag.

"6. Windows should not be fitted with removable or sliding screens. Practice has shown that the average person will not use care in keeping adjustable screening carefully closed and mosquito proof.

"In the Canal Zone screening does not make the rooms much hotter. The temperature seldom rises above 94° F.; the average daily temperature is approximately 80° F. The highest grades of copper only are used, and the screening is kept free from dirt and products of corrosion by frequent brushings.

"The conclusions are as follows:

"1. A properly screened dwelling can be depended upon to reduce by at least one third of the malaria incidence in a locality where malaria is endemic.

"2. In order to be effective, screening must be carefully planned, well installed, and kept in good repair."

International Sanitary Conference.

Surgeon-General Blue, provisional chairman of the International Sanitary Bureau of the American Republics, has issued the following announcement:

"In compliance with the resolution adopted at the Fifth International Sanitary Conference, the Sixth International Sanitary Conference of the American Republic will be held in Montevideo, Uruguay, December 13-21, 1914, under the presidency of Dr. E. Fernández Espiro and the auspices of the Government of Uruguay.

"A number of important sanitary subjects will be discussed at this conference, and it is expected that all the nations interested will be duly represented.

Provisional Program for the Conference.

"1. Review of sanitary legislation enacted in the different countries since the Fifth Conference.

"2. Report of progress made in adopting the resolutions agreed to in preceding conferences.

"3. Reports on morbidity and mortality statistics subsequent to the last conference.

"4. Recent developments in the campaign against plague, yellow fever, leprosy, trachoma, malaria, hookworm disease, tuberculosis, and venereal diseases.

"5. Measures adopted to combat the prevalence of cerebrospinal meningitis and acute infectious poliomyelitis.

"6. Progress made in maritime sanitation since the last conference, especially with reference to the opening of the Panama Canal.

"7. Data relating to the work of the Sanitary Information Bureau of Montevideo.

"NOTE.—With the approval of the program committee additional papers may be presented by any delegation on sanitary or scientific subjects of general interest.

"The reports by the various delegations shall be submitted in printed form to the secretary if the conference before the beginning of the sessions and will be accompanied by a short résumé."

Education in the Care of the Baby.

From *Public Health Reports* (March 20) we clip the following announcement:

The booklet referred to as published by the Public Health Service is an excellently practical treatment of the subject, containing in a few pages of simple reading more than could be collected elsewhere from sev-

eral large books. It may also be obtained from the superintendent of documents for five cents.

"The Indiana State Board of Health has issued a small booklet containing information for mothers and prospective mothers on the care of the mother previous to the birth of the child and the care of the child when born. A copy of this booklet is sent to each mother in Indiana when her first child is born. Information as to who the mothers are is obtained from the birth certificates registered. This is one of the ways in which birth registration can be made of direct value in public health administration.

"A committee of the American Association for the Study and Prevention of Infantile Mortality has also prepared a booklet on the baby which was adopted by the association at its meeting in Washington, D. C. in November, 1913. This booklet has been published by the Treasury Department and boards or departments of health can obtain copies for distribution to the mothers of infants by application to the surgeon-general of the Public Health Service in so far as the available edition will allow. Or health officers can furnish the addresses of mothers to the Public Health Service on frank slips which will be sent on request. Copies of the booklet will then be mailed to these addresses by the surgeon-general."

Surgeon-General Torney's Last Report.

The 1913 annual report of the surgeon-general of the army has just appeared. It is a 300-page volume dealing with the improvements, administration and needs of the medical department of the army during the year. Especial interest attaches to this report since it was the last to be issued before the death of General Torney, and to some extent sums up the progress made under his administration. The conclusions are given below:

"This report is the last which will be signed by the present surgeon-general on account of his retirement for age during the current fiscal year, after an incumbency of five years four and one-half months. It seems advisable, therefore, that a brief summary be made of the work done by the medical department

and of the results obtained under his administration.

"1. Typhoid fever, the most formidable of all camp diseases in the past, has apparently practically ceased to be a cause of non-effectiveness in our army. This, as is well known, is the brilliant result of the immunization of our army against this disease by the typhoid prophylactic. It was demonstrated in the maneuver camp at San Antonio in 1911 that it was entirely practicable to immunize a division upon mobilization without materially interfering with the military duties. The same can be done for any numbers of division. Thus, if at any time it becomes necessary to mobilize a large army of militia and volunteers, they can be properly protected against this disease in a short time after arrival in camp. The first steps in this campaign were inaugurated by my predecessor, General O'Reilly, in the latter part of 1908, and has been conducted to the present stage by the medical corps during my incumbency. I consider that, among the sanitary achievements of the medical department in preventive medicine, this measure for the prevention of this disease ranks second in importance only to the discovery of the method of transmission of yellow fever.

"2. It appears, as stated elsewhere in this report, that at last effective measures have been instituted to control the occurrence of venereal diseases. Practically the first note of this campaign was sounded in a circular letter from this office January 25, 1909. Since that time a vigorous campaign has been conducted, and interest throughout the medical department and the army at large has been aroused. The War Department was finally persuaded to take official action in 1912, and Congress, at the suggestion of this office, passed the act, for the stoppage of pay in 1912. The statistics for the year 1912 and for the first six months of 1913 show that the results obtained are eminently satisfactory, and would indicate that we may hope for still more satisfactory results in the future. Great credit is due to certain enthusiastic medical officers for especially good work done during this campaign.

"3. Prior to the year 1910 among the na-

tive troops in the Philippine Islands, beri-beri each year caused a large number of admissions to sick report and much non-effectiveness. This disease was also responsible for the greatest number of deaths, and was second only to tuberculosis as a cause for discharge for disability. Experiments conducted by several observers, and confirmed by the board for the study of tropical diseases in the Philippine Islands, showed that beri-beri occurred among people subsisting largely on highly-milled rice. As a result of recommendations by the board, orders were issued by the division commander and later by the War Department prescribing that only unpolished rice be issued and that a legume be added to the ration. Following the change in the ration, beri-beri has practically disappeared from among these troops. Only three cases occurred in 1911 and two in 1912.

"4. As a result of constantly improving sanitary measures, the constantly non-effective and admission rates have steadily declined since the Spanish-American War. During the last few years, as the result of the antityphoid and venereal campaigns, these rates have decreased more rapidly, and in 1912 were the most satisfactory on record. This year, 1913, bids fair to eclipse all records, and it would seem at the present time that these rates this year would reach an almost irreducible minimum.

"5. Camp sanitation has been improved, simplified, and rendered inexpensive. It is being demonstrated each day that troops properly protected against typhoid fever and smallpox can live in camps suitably located, with the present method of camp sanitation, for an indefinite length of time with no increase in morbidity or mortality."

Housing Conditions in Dublin.

An editorial in the *Medical Officer* of February 28 comments on the existing housing conditions in Dublin as reported by a committee which has recently made an investigation. The conditions reported ought to make us feel that our own housing problem is simple and capable of being relatively easily handled. Certainly now is the time to improve our conditions in this country

and to pass laws which will prevent our ever getting into Dublin's condition. We quote the editorial entire, as follows:

"It is not improbable that if decent and proper houses were provided for the people much saving might thereby be effected both to the state and municipality by the raising of the moral tone of the people and the almost certain consequent reduction in crime and sickness. It is in these words that the departmental committee, appointed by the Irish Local Government Board to enquire into the housing conditions of Dublin, refers the more energetic administration of the public health laws in Dublin. That there is great need for more energetic administration is apparent on almost every page of the committee's report. Nearly one half of the industrial population of Dublin live in tenement houses or in insanitary small houses. The tenement houses are nearly all old structures built originally to accommodate a single family; many are in a more or less advanced state of decay, and the rental charged for the individual tenements is out of all proportion to the accommodation given. As many as 20,000 families live in one-room tenements, and over 1,500 cellars are occupied by families. Most of the houses have back yards, but there is only one tap to supply water to all the occupants of the house. The sanitary conveniences are either in the yard or sometimes in the cellar, and can be used not only by the dwellers in the tenement but by anyone else who likes to come in. The roofs of the houses are bad, the stairs cramped, the floors out of repair, the window frames and sashes perished, and there is generally about them a state of indescribable filth. As regards about 27,000 of the tenements, a rental of less than 3s. a week is charged with respect to 13,000, of 3s. for about 5,000, and of more than 3s. for 9,000. Speaking generally, the tenement house property is owned by a large number of small owners, who own at the most about forty houses each. The owners include three members of the Dublin corporation.

"The committee suggests that the non-enforcement of the sanitary laws has permitted houses to be inhabited which are

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not fit for habitation, and that the want of a firm administration has created a class of owners with but little sense of their responsibilities as landlords, and that this has helped much in the demoralization of the working classes and increased the number of inefficient workers in the city. It is further suggested that the provision of sanitary dwellings by private enterprise has been to some extent handicapped by unfair competition with insanitary dwellings which could be let at rents that would not pay for the provision of decent houses. After reading the report of the committee, we are not surprised that the tenement system is condemned absolutely and that the erection of self-contained dwellings is recommended. It is advised that 14,000 at least of these are required, and it is evidently in the minds of the committee that assistance might be forthcoming from the State in providing these houses. The story told in the report is a sad one, but it is one that has been more than suspected by housing reformers. Now that the facts have been stated officially we do not doubt that public opinion will insist upon remedial measures being adopted. But the first essential is a firm and impartial administration of the existing laws."

Investigation of Venereal Disease.

A communication in the February number of the *Southern Medical Journal* urges the Southern Medical Association to appoint "a commission for the study prevention and eradication of venereal disease in the southern states." The writer says:

"With yellow fever disposed of, malaria, uncinariasis and pellagra receiving competent attention, can we not devote some effort to the control and eradication of the greatest scourge of all—venereal disease?"

"The venereal disease is not peculiar to the South, nor does it prevail more extensively here than elsewhere, but this does not lessen our duty or lighten our burden. Racial and economic conditions make it a special problem for us, and we must accept it for our own protection. The extent of the ramifications has never been investigated, no survey made or effort made to control its spread.

"A filthy, polluted body endangers the innocent, pelvic operations destroy posterity, blind asylums are expensive, and insane hospitals mark the nation's decay; and all these are increasing, yet nothing is being done to stay the tide.

"The Southern Medical Association needs a commission for the study and prevention of venereal disease. The work of such commission, briefly, would be as follows:

"1. Gathering information and compiling statistics:

"(A) Prevalence of venereal disease in (a) the negro race, (b) Caucasian race.

"(B) Extent of transmission of venereal disease and the method of transmission, (a) sexually, (b) innocently.

"(C) Existing and past legislation, with results.

"(D) Estimation of the economic results of these diseases.

"2. Dissemination of information:

"(A) The gravity and end results of neglected venereal disease.

"(B) Methods of prevention.

"(C) Importance and possibility of cure.

"(D) Campaign of education for physicians.

"3. Recommending to and assisting bodies endeavoring to prevent or minimize venereal disease, and attempting to stimulate proper legislation."

INDUSTRIAL HYGIENE AND SANITATION.

The Visiting Nurse Service.

Although no vital statistics on the subject are now available, it cannot be doubted that the visiting nurse service can be made an important factor in the reduction of mortality among industrial workers. Occupational diseases are often aggravated by a lack of proper treatment, unfavorable home conditions, or a general ignorance of personal hygiene. Such being the case, a visiting nurse can be of enormous value by administering aid at the proper time and by giving instruction for correct living.

The writer has just received a pamphlet telling of the visiting nurse service of a leading insurance company in New York. The service, which is extended to the industrial policy-holders, was introduced as an experiment, in only a limited section, but it was so highly appreciated by the policy-holders that the territory was extended over several sections of the city.

The work is carried on in coöperation with the attending physician whenever possible, and in case the patient cannot afford to engage a physician it is the duty of the nurse to make some arrangements for medical services. Such service among the industrial workers cannot fail to prolong life, and thus pay good returns for the investment. The time-worn adage concerning "a stitch in time" is nowhere truer than in the conservation of human life. This fact is being recognized, not only by insurance companies to whom such conservation is of most direct value, but also by various other organizations whose success depends upon the efficiency and longevity of the human machine.

Although an insurance company may adopt the visiting nurse service merely as an investment, expecting to get returns either by the prolongation of life or in public "good will," it must be borne in mind, however, that society itself is the original and most important life insurance company,

having the largest investment and to whom the greatest profits must accrue in all conservation of life and health.

The Health of the Worker.

There is a pamphlet with the above title, written by Prof. C.-E. A. Winslow and published by the Metropolitan Life Insurance Company, which states very succinctly the "dangers to health in the factory and shop and how to avoid them." The dangers from factory dusts and fumes are carefully described and practical suggestions are given for the removal of vitiated air by means of suction. The importance of proper lighting, and washing and toilet facilities is duly emphasized.

The pamphlet also contains a résumé of the sanitary standards adopted by the Joint Board of Sanitary Control in the New York Cloak, Suit and Skirt Industry. A single glance at the adopted standards reveals the fact that they are not a list of idealistic recommendations but rather a set of standards which are attainable, and really essential to health, comfort, and common decency in factory life:

"1. No shop is to be allowed in a cellar.

"2. No shop is to be allowed in rear houses or attic floors without special permission of the board.

"3. Shops located in buildings two stories or more in height must have one or more fire-escapes.

"4. All fire-escapes are to be provided with ladders to the roof of same house or to an adjoining house; also with full length drop ladders properly located and adjusted.

"5. In all shops which are provided with automatic sprinklers, there should be kept a sufficient number of chemical extinguishers, or a sufficient number of fire buckets, properly located and filled.

"6. Special caretakers are to be appointed in each shop for the care of the fire buckets, and for their use in case of fire.

"7. All openings and exits to fire-escapes are to be left unobstructed by tables, machines, boxes, partitions, and iron bars.

"8. No doors are to be locked during working hours.

"9. No smoking is to be permitted in the workshop.

"10. Conspicuous signs are to be placed throughout the shop, marking location and direction of exists and fire-escapes.

"11. Fire-proof receptacles, lined with tin, and having a tin cover, are to be provided, in sufficient numbers, for rubbish.

"12. Halls and stairways leading from shops are to be adequately lighted by natural or artificial light.

"13. Stairs are to be provided with secure handrails and safe treads.

"14. Sufficient window space is to be provided for each shop, so that all parts of the shop be well lighted during the hours from 9 a. m. to 4 p. m.

"15. Where gas illumination is used, arc-lights or incandescent mantles should be used.

"16. All lights are to be well shaded, placed above operatives, and not too near them.

"17. At least 400 cubic feet of space, exclusive of bulky furniture and materials, should be provided for every person within the shop.

"18. The shop should be thoroughly aired before and after work hours, and during lunch hour, by opening windows and doors.

"19. No coal should be used for direct heating of irons, and whenever stoves are used for heating shops, they should be surrounded by metal sheet at least five feet high.

"20. Walls and ceilings of shops and water-closet apartments should be cleaned as often as necessary, and kept clean.

"21. Floors of shops, and of water-closet apartments, are to be scrubbed weekly, swept daily, and kept free of refuse.

"22. A separate water-closet apartment shall be provided for each sex, with solid partitions to extend from floor to ceiling, and with separate vestibules and doors.

"23. Water-closets are to be adequately flushed and kept clean.

"24. A special caretaker is to be designated by the employer to the care of the shop and water-closet apartments.

"25. A sufficient number of water-supplied wash-basins is to be provided in convenient and light locations within the shop.

"26. Suitable hangers should be provided for the street clothes of the employees, and separate dressing-rooms are to be provided wherever women are working.

"27. Water-closet apartments, dressing-rooms, wash-rooms, and lunch-rooms are to be properly lighted, illuminated, ventilated, cleaned, and kept clean.

"28. All seats are to have backs."

Legislation for Working Women.

In the *Illinois Factory Inspection Bulletin*, Mr. Oscar F. Nelson, chief state factory inspector, gives a brief synopsis of "some recent legislation for the benefit of working women." The following will give an idea of what some of the states are doing for their working women:

Rhode Island has passed a law prohibiting the employment of women more than ten hours in one day and more than fifty-four hours per week, in factories, manufacturing, mechanical, business, or mercantile establishments.

The new Delaware law provides a ten hour-day and a fifty-five hour week in many occupations, but it exempts the canning industry which is one of the most important in the state. One working day of twelve hours each is permitted.

Texas passed a ten-hour day and fifty-four-hour week law, but exempted the cotton mills which probably employ a great majority of Texas' 4,000 women factory workers.

In New York a new law has been enacted which prohibits the employment of women at-night in manufacturing between 10 p. m. and 6 a. m.

The new Massachusetts law extends the fifty-four-hour limit to telephone exchanges and to other lines of work besides factories.

Nebraska has established a nine-hour day and a fifty-four-hour week, with the provi-

sion that no women shall be employed between the hours of 10 p. m. and 6 a. m.

The Pennsylvania law which became effective November 1, 1913, is quite comprehensive. With the exception of canneries and hospitals, women cannot be employed more than six days or fifty-four hours in any one week, or more than ten hours on any one day. There are a few exceptions to this in case of overtime, which is carefully limited. There is also a limit upon the time of employment during the day, upon the length of lunch hour, and upon the number of hours of continuous work without rest periods. Dangerous fumes, dusts, and gases must be removed, clean water must be supplied without charges, proper toilet facilities must be furnished, and seats provided for employees. Workrooms must be kept sanitary, well lighted and ventilated, buildings above the second story must have at least two exits, and fire drills are required where women and girls are employed.

Wisconsin's new law provides that no woman shall work more than ten hours except upon consent of the Industrial Commission. Thus far one exemption has been made. The author questions the advisability of this power, since it may open the way for the practical annulment of the women's labor hours law.

Montana upheld the legality of the new nine-hour woman's employment law when the first prosecution resulted in fining a hotel proprietress fifty dollars.

In Minnesota no woman can legally be employed in a restaurant more than ten hours a day, and in mercantile and manufacturing employments including telephone offices not more than nine hours. Sixty minutes must be allowed for the noonday lunch.

California has passed an eight-hour law which applies to all female labor except office help. The hours of women employment is restricted to forty hours per week, but the canning industry is exempted.

Oregon has established a nine-hour day and a fifty-four-hour week for female labor. Forty-five minutes must be allowed for lunch. Ohio limits the employment of female labor

to ten hours in any one day and to fifty-four hours in a week.

Washington passed an eight-hour law for women, but exempted the canneries.

Illinois failed to pass a bill limiting the employment of women to fifty-four hours per week. Women may now be worked seventy hours per week.

The above synopsis shows the general trend of present-day legislation. No well-informed person will deny that a reasonable limitation of hours of labor is of untold value to society in general. In regard to the manufacturer's position the author makes the following unqualified statements:

"The manufacturers of the states that protect their women are quite able to compete with those of backward states. Fewer hours for women means greater efficiency and greater interest in the work. It is wise to conserve the human machine, as Secretary Redfield, a manufacturer himself, has argued. Protection of our female employees pays, and the old fallacies against it cannot be mumbled with a serious face."

Hygiene of the Painters' Trade.

A very admirable presentation of the above subject is to be found in *Bulletin No. 120*, United States Bureau of Labor Statistics, by Alice Hamilton, M. A., M. D. The author gives not only a detailed discussion of lead poisoning but also the results of various experiments and observations pertaining to the subject. The hygiene of the painters' trade is briefly but clearly set forth in the author's summary, which is substantially as follows:

Paint consists essentially of pigment ground in a liquid vehicle, and either the pigment or the vehicle may possess poisonous properties.

The dangerous pigments are the different salts of lead, the basic carbonate, red lead and orange mineral, the chromate, and the basic sulphate. Experiments with the basic carbonate and the basic sulphate show that the former is much more soluble in human gastric juice than the latter and causes more rapid and severe poisoning in animals.

The danger in the use of leadless paints and of paint removers comes from the liquid vehicle and is increased by lack of proper ventilation. If quickly drying flat finish paints are used in close, ill-ventilated rooms, serious poisoning from the fumes of coal-tar products and of turpentine may result. The danger from the use of lead paints comes from paint dust in the air and from paint smeared on the hands which may be carried into the mouth with food or tobacco.

Paint dust is caused chiefly by rubbing old or new paint with dry sandpaper. This process is universally recognized as the most dangerous part of the painters' trade. It could be completely done away with by the use of cheap mineral oil to wet the sandpaper and catch the dust.

The protection of the painter against poisoning through unwashed hands can be affected only by providing adequate washing facilities and a clean lunchroom wherever work with lead paint is carried on.

Interior house painting, ship painting, and certain kinds of painting, including railway cars, are the most dangerous branches of the trade in the United States.

The painters' trade is regarded in all countries as the most important of the lead industries. Six European countries have carried on investigations in the use of lead paint in industry, and five have recommended legislation more or less comprehensive to lessen the dangers to which painters are exposed. In the United States, Illinois alone has passed such a law, and it does not cover any painting except that done in workshops.

A study of hospital reports from four cities shows that one fourth of the hospital cases of lead poisoning in these cities were painters. In New York City the proportion is even greater. Forty of sixty fatal cases of lead poisoning in New York were painters.

Among 1,009 painters in Chicago who sent answers to a list of questions, 185 gave a history of lead poisoning, 72 of kidney trouble, 77 of rheumatism, and 24 of stomach trouble. One hundred able-bodied painters presented themselves for physical examination by a specialist in occupational diseases, who found

that 59 of them showed evidence of chronic lead poisoning.

An analysis was made of the hospital or dispensary histories of 100 lead-poisoned painters. The proportion of complicated and of chronic cases was large, over half had had more than one attack, 39 had had palsy, and 9 had had brain symptoms.

This study of the painters' trade in the United States shows that there are many elements of danger, most of them avoidable, and it shows that if protective legislation is to be passed it should be directed toward the prevention of poisonous fumes and dust, and the provision of facilities for bodily cleanliness.

Such legislation should (1) forbid the use in unventilated rooms of paints or paint removers containing volatile poisons; (2) forbid dry sandpapering or dry chipping off of lead paint; (3) insist that the employer provide a proper place for his workmen to hang their street clothes and keep and eat their lunch, and a washroom with a sufficient number of basins, warm water, soap, towels, and brushes; (4) require the labeling of all paint offered for sale in such a way that the painter can be apprised of the danger involved in its use; (5) in the case of work done in factories, cards of instruction for the workmen should be posted, and if necessary these should be written in one or more foreign languages.

The total prohibition of lead paint for use in interior work would do more than anything else to improve conditions in the painting trade. Doctor Hamilton's report is excellent and should be studied by all interested or engaged in the painters' trade.

The Cause of Occupational Disease.

It is well worth noting the opinion of students of industrial hygiene, regarding the most important factors of causation in occupational diseases. The list of causative factors is long and varied, and since under such conditions much time and energy is apt to be given to relatively unimportant affairs, it is highly desirable that the question of values be given careful attention. The following paragraph, taken from the

United States *Labor Bulletin* No. 127, by William C Hanson, M. D., gives apparently a very fair statement of the case:

"The late Dr. Charles Harrington, under whose supervision was shown in Boston, Mass., in 1907, for the Massachusetts State Board of Health, the first exhibit in America relating to occupational diseases, called attention to the fact that the disastrous effects attributed to occupations were in very large part due to non-observance of the principles of general hygiene and chiefly to inattention to that most important sanitary measure, perfect ventilation. He further gave it as his opinion that 'with proper attention to this matter and improvement in the home and home influences, greater attention to the character and preparation of food, and a more general observance of the beneficial influence of active outdoor exercise, no very great differences would be noted in the health of the various classes of working people, and the expression "occupational diseases" would lose whatever significance it now has.' "

The American Museum of Safety.

One of the most valuable movements in America for the advancement of industrial safety and sanitation has been instituted by "The American Museum of Safety." The work of the organization is divided into three general departments, namely, that of Chemical Industries, Education, and Industrial Hygiene and Occupational Diseases. The last department is still further subdivided into care of the sick and injured, communicable diseases, factory planning, food and industrial dietetics, illumination, ventilation and heating, and water supplies. Each of these departments and sub-departments are directed by experts.

The opportunity for invaluable social service in the field chosen by this organization is boundless, and if it can maintain a non-commercial position as are its claims, its recognition generally as a social benefactor is assured.

The best conception of the museum's work and ideals may be gained from the organization's own statement, appearing in the *Monthly Bulletin*. It is as follows:

"The American Museum of Safety was organized and is maintained for the prevention of accidents, the elimination or lessening of occupational diseases, and the promotion of industrial welfare through health, efficiency and coöperation.

"There are now twenty-five museums of safety and institutes for the study of industrial hygiene in the world. The American Museum of Safety—twelfth in the world series of museums—was incorporated by special charter from the Legislature, Chapter 152 of the Laws of 1911, of the State of New York. It is the only institution of its kind in the United States.

"The museum is located at 29 West 39th Street, where it occupies the sixth floor of the Engineering Societies' Building. Its collections include not only actual devices and models of safety and sanitary appliances, but also a highly specialized library of books, pamphlets, reports, photographs and lantern slides, illustrating the simplest and most practical methods of protecting dangerous machines and processes. The museum is absolutely non-commercial and does not sell or take orders for any of the devices it exhibits.

"The museum is open daily from 9 a. m. to 5 p. m.—except on Sundays and holidays—and is free to the public. By special arrangement, it may be kept open from time to time for evening visits by technical societies, superintendents and foremen, inspectors, and bodies of educators, students and workmen."

The New York Factory Investigation.

In a very voluminous report, Dr. George M. Price, director of the New York State Factory Investigation, states quite clearly and fearlessly the results of his investigation of "existing conditions under which manufacture is carried on in the cities of this state, as to matters affecting the health and safety of operatives." The conditions found in New York are, doubtless, characteristic of those prevailing throughout many manufacturing centers.

In connection with the general sanitary investigation, the following subjects were given special attention: factory location

and construction, light and illumination, ventilation, washing facilities, lunch rooms, toilet accommodations, and sanitary care and comforts.

The occupation of lofts and cellars by manufacturing establishments presents a very serious phase of the factory problem, in regard to proper lighting, ventilation, and fire protection. To relieve such conditions in the "loft" industries, three remedies are proposed:

(1) The limitation of occupancy according to the character and number of building exits.

(2) The installation of mechanical ventilating plants.

(3) A licensing system for all establishments located in such buildings.

The importance of proper illumination is recognized by the author as follows: "It is universally admitted that inadequate lighting of industrial establishments affects not only the eyesight and general health of the employees, and the efficiency of their work, but is also responsible for the number and the frequency of accidents. There are, however, as yet, no scientific standards to determine what 'adequate,' 'sufficient' and 'proper' lighting of factories should be."

Arthur Shadwell, writing on "Industrial Efficiency," says: "In the United States I have seen so many mills and other works miserably lighted;" and also, "A bad light is the most conspicuous and general defect of American factory premises."

Speaking of ventilation, the author says: "No attention whatsoever, as a rule, is paid by those who construct factory buildings or by the employers of individual establishments to the subject of ventilation. The opinion seems to prevail that a change of air in the place should come by itself without human aid or mechanical means, and that no special provisions need be made for ventilating industrial establishments. . . . In a large number of shops inspected the air was close, the shops were over-crowded, bad odors were often noticeable, temperatures were frequently high, humidity excessive, dust abundant, and gases and fumes quite oppressive."

The importance of cleanliness, especially in some of the dangerous dusty trades, cannot be too strongly emphasized. Quoting the author, "The worst feature in most of the industrial establishments, however, is the lack of proper supervision of the working force as far as washing facilities are concerned. There is hardly any factory where the washing-up at noon hour or after work is made compulsory, or is supervised by foremen. One of the reasons why plumbism is being eliminated in the Pullman car shops at Pullman, Ill., is the stringent lavatory supervision at the noon hour."

The number of factories providing separate lunch rooms was found to be only 3.8 per cent., and "even in those establishments where poisonous substances, clinging to the hands, directly endanger the life of the workers, a separate lunch room is still the exception to the rule."

The lack of adequate toilet accommodations is another feature of factory life that Americans may well be ashamed of. The location is often inaccessible, the plumbing often obsolete, and in some instances the old fashioned privies and trough closets are used. "In one shoddy mill we found that the owner (a member of the local health board) had neglected to provide any water-closets for his employees. The substitute for proper toilet accommodations was a wooden barrel in a sub-cellar of his establishment."

Medical supervision and instruction and first aid facilities are strongly urged by the author. In not one of the establishments inspected was provision made for proper instruction of workers in the specific dangers of their trade, in the prevention of these dangers, in the care of their persons or in knowledge of the ordinary risks of their daily work.

"A campaign of education is of the first importance for the employers as well as employees."

Occupational Diseases.

The *New York Medical Journal* in a recent number summarizes an article on occupational diseases which appeared in the *Medi-*

cal Record on January 31. It contains very valuable suggestions. We quote as follows:

"W. G. Thompson refers to the principal occupational diseases, to what has been done in this country and England in investigating and avoiding them, and states that in Vienna, Berlin, and nearly a dozen other foreign places there are now museums of safety, where all kinds of devices are exhibited to secure the safety and health of workmen. In Milan there is a hospital of 150 beds, with excellent laboratories and outpatient department, exclusively for treatment of industrial diseases. There seems, he says, a great lack of literature on occupational diseases; he believes that at the present time physicians should collect more accurate data. In his own clinic he uses a special kind of history card for the reporting of industrial diseases. He emphasizes the importance of definite and coöperative investigation; the subject calls for coöperation of economists, philanthropists, physicians and legislators. Suitable legislation, he feels, is bound to come."

An Important Congress.

A committee has been organized for the purpose of inviting the attention of the medical profession and all others interested in the prevention of occupational diseases to the Third International Congress on

Diseases of Occupation to be held in Vienna in September, 1914.

Industrial diseases and accidents are everywhere assuming more and more importance and our knowledge should be based upon accurate data. These Congresses, begun in 1906, afford an excellent opportunity to scientists, clinicians and industrial experts to present the results of their research and observations before an international body specially interested in the prevention and treatment of a most important class of diseases.

Among the topics which will be considered at the coming Congress are:

1. The physiology and pathology of fatigue, with special reference to vocational work and to the effects of night work on the nervous system.
2. Work in hot and damp air.
3. Occupational Anthrax.
4. Pneumoconiosis.
5. Injuries caused by electricity.
6. Industrial poisons.
7. Injuries of hearing caused by industrial pursuits.
8. Miscellaneous communications.

All are cordially invited to attend. For membership fees, mail postal money order for \$5 to the general secretary of the Congress, Dr. Ludwig Teleky, No. 23, Türkenstrasse IX, Vienna, Austria.

CURRENT PUBLIC HEALTH LITERATURE.

AMERICAN.

American Journal of Tropical Diseases and Preventive Medicine, New Orleans.

I. No. 8. Feb.

- Cultivation of Malarial Plasmodia in Vitro. C. C. Bass.
Annual Report of the Health Department. W. H. Deaderick.
Cultivation of the Bacillus of Leprosy: A Review. P. G. Woolley.

Boston Medical and Surgical Journal.

CLXX, No. 11. Mar. 12.

- Vaccination Efficiently Performed. E. F. Cody.

Engineering News.

LXXI. Mar. 5.

- Water Supply and Sewage Systems of the U. S. Naval Training Station, Great Lakes, Ill.

Engineering Record.

LXIX, No. 9. Feb. 28.

- American Waterworks Association Analyzing Uses of Water.

LXIX, No. 10. Mar. 7.

- Distribution of Sewage on Filters.

LXIX, No. 11. Mar. 14.

- Sewage Plant Management.
Garbage Reduction Recommended for Detroit.
Volume of Chemical Change During Water Purification.

LXIX, No. 12. Mar. 21.

- St. Louis Builds World's Largest Mechanical Filter Plant.

Journal of Experimental Medicine, New York.

XIX, No. 3. Mar.

- Relation to the Blood and Virus of Epidemic Poliomyelitis. P. F. Clark, F. R. Fraser and H. L. Amoss.

Journal of Medical Research, Boston.

XXV, No. 1. Mar.

- A Study of the Market Butter of Boston. M. J. Rosenau, W. D. Frost and Ruth Bryant.

Journal of the American Medical Association.

LXII, No. 9. Feb. 28.

- An Economic View of Venereal Infections. James Patterson, Chicago.
Epidemic Poliomyelitis and Distemper of Dogs. R. H. Pierson, Fort Gibbon, Alaska.
Trichinosis. J. M. Van Cott and W. Lintz, Brooklyn, N. Y.

LXII, No. 10. Mar. 7.

- A Scale, Based on the Work at Ellis Island, for Estimating Mental Defect. Howard A. Knox.
The Underlying Factors in the Spread of Tuberculosis. Albert Philip Francine.

LXII, No. 11. Mar. 14.

- The Tuberculosis Problem, Continued.

LXII, No. 12. Mar. 21.

- The Tuberculosis Problem, Continued.

LXII, No. 13. Mar. 28.

- The Diagnosis of Whooping-Cough by the Complement-Deviation Test. Preliminary Note. Alfred Friedlander and E. A. Wagner.
The Tuberculosis Problem, Continued.

New York Medical Journal.

XCIX, No. 8. Feb. 21.

- Morality of Venereal Prophylaxis. R. A. Bachman.

XCIX, No. 11. Mar. 14.

- Experimental Study of Tubercle Bacilli Submerged in Water. R. C. Rosenberger.

Public Health Reports.

XXIX, No. 9. Feb. 27.

- Prevention of Malaria: Suggestions on How to Screen the House to Keep out Effectively the Mosquitoes Which Spread the Disease. R. H. von Ezdorf.

XXIX, No. 10. Mar. 6.

- Public Health Administration. W. C. Rucker.

XXIX, No. 11. Mar. 13.

- Malarial Fevers: Prevalence and Geographic Distribution in South Carolina, Georgia and Florida. R. H. von Ezdorf.

XXIX, No. 12. Mar. 20.

- Plague in Cuba.
Typhus Fever.
International Sanitary Conference.
Common Sense in Public Health Administration. W. C. Rucker.

FOREIGN

Annales De L'Institut Pasteur, Paris.

XXVIII, No. 2. Feb.

The Diarrhœa of Infants. Metchnikoff.

Researches on the Intestinal Flora in Infantile Diarrhœa. Bertrand.

Centralblatt für Bakteriologie, Usw.

Originale, Erste Abt.

Bd. 73. Heft 1. Feb. 11.

Studies in Avian Tuberculosis. L. R. Himmelferberger.

The Virulence of Fixed Rabic Virus for Man. S. Kozeqalaw.

Deutsche Medizinische Wochenschrift, Berlin.

XL, No. 5. Jan. 29.

Industrial Diseases. Holtzmann and Koelsch.

XL, No. 7. Feb. 12.

Healthy Carriers of Epidemic Poliomyelitis. C. Kling and A. Pettersson.

Journal of Hygiene, Cambridge.

XIII, No. 4. Jan.

Note on the B. Coli Test. A. C. Houston.

The Detection of Anthrax Spores in East India Wool and in Yarn Manufactured therefrom. P. L. Sutherland.

Immunity Reactions of an Inagglutinable Strain of B. typhosus. James McIntosh and James M. McQueen.

A Study of Summer Diarrhœa in Warrington in 1911. C. W. Hult.

Note on the Plate Method for Enumeration of Bacteria. Andrew Cunningham.

The Effects of Nitrogen-peroxide on the Constituents of Flour in Relation to the Commercial Practice of Bleaching. Flour with that Reagent. Benjamin Moore and J. T. Wilson.

On the American Method of Standardizing Tetanus Anti-toxin. Alfred McConkey.

Plague Supplement III.

Journal of Pathology and Bacteriology.

XVIII, No. 3. Jan.

Water Storage and its Advantages. A. C. Houston.

Remarks on Typhoid Bacilluria: With a Description of Certain Atypical Coli-Typhoid Bacilli Found in the Urine in Enteric Fever. Adam Patrick.

Journal of the Royal Sanitary Institute, London.

XXXV, No. 2. Mar.

Housing Problems in a Northern Industrial Town. S. J. Clegg and William Hudspeth.

Some Points in the Relationship of Bovine to Human Tuberculosis. H. P. Hutchens.

Journal of State Medicine, London.

XXII, No. 3. Mar.

Sexual Disease and the Individual. A. O. Smith.

Mentally Defective Children and their Treatment. E. Sayer.

Medical Officer, London.

XI, No. 6. Feb. 7.

Medical Inspection of Secondary Schools. R. Hughes, M. B., London.

VI, No. 8. Feb. 21.

Vaccination Question in the Light of Modern Experience. C. Killick Millard.

VI, No. 9. Feb. 28.

The Danger of the Domiciliary Treatment of Tuberculosis. Oscar Holden.

VI, No. 10. Mar. 7.

Paisley Special Class School for Physically and Mentally Defective Children. A. Gilmour.

VI, No. 12. Mar. 21.

The Prevention of Tuberculosis from the Social Side. Hilda Clark.

Munchener Medizinische Wochenschrift.

LXI, No. 3. Jan. 20.

The Etiology of Poliomyelitis. F. Lust and F. Rosenberg.

LXI, No. 7. Feb. 7.

Lead Poisoning from Water Pipes. A. Schwenkenbecher.

Presse Medicale, Paris.

XXII, No. 8. Jan. 28.

Cultivations of the Virus of Rabies. G. Volpino.

Proceedings of the Royal Society of Medicine, Epidemiological Section.

VII, No. 4. Feb.

Stillbirths: The Care for Compulsory Registration and Their Definition. R. Dudfield.

Public Health, London.

XXVII, No. 5. Feb.

House Flies and Disease.

The Organization of the Health Department of a Large Town. G. P. Johnson, M. D., Stoke-on-Trent.

The Reform of the Public Health Service. H. Jones. Herefordshire.

Problems of Rural Housing. W. G. Savage, M. D., Somerset.

Problems of Rural Housing. A. A. McWhan, Glasgow.

Public Health Journal, Toronto.

V, No. 2. Feb.

Medical Inspection of Schools in Toronto. W. E. Struthers.

Status of School Dentistry. A. Irwin.

School Nursing in Toronto. L. L. Rogers.

AMERICAN JOURNAL OF PUBLIC HEALTH

SOCIOLOGICAL ASPECTS OF THE RE- CENT HEALTH DEPARTMENT RE- ORGANIZATION IN NEW YORK STATE.

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Commissioner of Charities, New York City.

Read before the Sociological Section, American Public Health Association, Colorado Springs,
September, 1913.

I suppose I have used the words "social" and "sociological" as frequently, as loosely, and as rashly as has any one. When I came to outline the sociological aspects of the recent health reorganization in New York State, I was impressed by the absence in my own mind of a very definite conception as to the meaning of the words and, rather shamefacedly, I consulted Webster. That may be a daring statement with which to introduce a paper but my temerity goes to even greater extremes, for I'm going to quote the definition. "Sociology is that science which investigates the laws and forces which regulate human society in all its grades, existing and historical, savage and civilized." In New York we have all grades of society. We are also partly savage and partly civilized. The breadth of meaning given the word accounts for its universally hazy application; it also justifies me in challenging any one to mention anything which is *not* sociological, within or without the reorganized health department. However, I hope to emphasize a few of the points which may be said to be "sociologicaler."

Without entering into the details of the departmental reorganization, with which you are undoubtedly familiar, it may be well in the first place to briefly review those phases of the law as it stands today which are of special significance from our present point of view.

Section 3 of the law states that there shall be nine divisions of the new state department, the more important of which are as follows.

1. Division of Administration.
2. Division of Communicable Diseases.

3. Division of Vital Statistics.
4. Division of Publicity and Education.
5. Division of Child Hygiene.
6. Division of Public Health Nursing.
7. Division of Tuberculosis.

We can discuss only those phases of the law which are of greatest importance from a sociological standpoint. These, in turn, may be classified as either concrete steps in legislative health progress as actually embodied in the law, or, on the other hand, as abstract philosophical principles indicated and emphasized by the tendencies of the legislation under discussion.

As concrete examples we may take the following:

1. An Increase in the Powers and Duties of the State Officials.

The law states that the term of office of the commissioner shall be six years (p. 1). The necessity for the services in this position of a specially trained man, who shall be able to make the work his chief occupation, is recognized by the provision of the law which increases his salary to \$8,000 per year (p. 3) and by the clause which states that "during his term of office he shall not engage in any occupation which would conflict with the performance of his official duties" (p. 1). He has the power to divide the state into sanitary districts and to appoint supervisors for the same (p. 5). He is empowered to appoint local health officers in communities where the local boards fail to make the appointment (p. 7). These, and other measures applying to the sanction of the sanitary code (pp. 2 and 3), and to the financial compensation (p. 9), the tenure of office (p. 8), and powers (p. 12) of the local health officer, all reflect that democratic tendency in American governmental reform which is manifested by the centralization of power and the enhancing of official responsibility.

2. Improved Statistics as to Nativity, Morbidity and Mortality.

The provisions of the law in this regard reflect the awakening social consciousness of the community at large and the desire on the part of the community for a keener social sense of direction. The sanitary supervisors are encouraged to "promote efficient registration of births and deaths" (p. 5); the local health officers are specifically commanded to "take such steps as may be necessary to secure prompt and full reports by physicians of communicable diseases, and prompt and full registration of births and deaths" (p. 12).

3. An Annual Sanitary Survey.

The demand on the part of society for rational social book-keeping is further recognized by that provision under "the powers and duties of health officers" which states that they are to "make an annual sanitary survey and maintain a continuous sanitary supervision over the territory within their jurisdiction" (p. 12).

4. A Medical Inspection of School Children and School Equipment.

It was recognized by the legislators that the most delicate criterion of social progress is the welfare of society's future citizens. The law states that there shall be "a medical examination of every school child as soon as practicable after the opening of each school year." It adds that there shall be "a sanitary inspection periodically of all school buildings . . . and report thereon to those responsible for the maintenance of such school buildings" (p. 12).

5. Provision for Public Nursing.

A keen social indicator is the care which society takes of its disabled members. Generous provision is made for public health nurses. Perhaps never before has actual legislation gone into such detail concerning this important health activity. To quote the law again: "Each health officer . . . shall have power to employ such number of public health nurses as in his judgment may be necessary within the limits of the appropriation. . . . They . . . may be assigned by him to the reduction of infant mortality, the examination or visitation of school children, or children excluded from school, the discovery or visitation of cases of tuberculosis, the visitation of the sick who may be unable otherwise to secure adequate care, the instruction of members of households in which there is a sick person, or to such other duties as may seem to him appropriate" (p. 13).

6. The Coöperation of Medical Organizations.

The value of utilizing positive, constructive, coöperative methods in social and sanitary reform is exemplified by that provision under the duties of the sanitary supervisor which admonishes him to "endeavor to enlist the coöperation of all the organizations of physicians within his district in the improvement of the public health therein" (p. 6).

7. The Public Health Council.

This council, consisting of seven members, appointed by the governor, is a most important feature. It is given power to enact laws for the preservation of health and the prevention of disease, and these laws are to go into force upon enactment, and supersede any previous local health regulations inconsistent with them, except in New York City. The council is to be made up of two laymen, one sanitary engineer, three physicians and the commissioner.

8. It may be mentioned here that a complete, new vital statistics law was also enacted, in form essentially as recommended by the Federal United States Bureau.

Time forbids detailed reference to the many other concrete examples of social progress. More fundamental, perhaps, are the somewhat abstract principles fully recognized in the health reorganization. These also lend themselves, though perhaps less readily than the former, to tabulation, and we will briefly deal with the more important ones:

1. Unification, Coördination, Centralization in Health Administration.

That the problems of one community are much the same as those of another community, and that a common solution, perhaps with special modifications, is frequently applicable to all, may have been long recognized in theory, but surely these principles have seldom been actually applied in health work. The demand for coördinate activity is met by special provisions which empower the sanitary supervisor "to call together the local health officers within his district or any portion of it from time to time for conference" (p. 5); which demand of the health officers that they "attend the annual conferences of sanitary officers called by the State Department of Health, and local conferences in the sanitary district" (p. 13). It is well for the state's right hand to know what the other hand is doing. As an illustration of the centralization of power it is specifically enacted that "the provisions of the sanitary code shall, as to matters to which it relates, and in the territory prescribed therefor by the public health council, supersede all local ordinances heretofore or hereafter enacted inconsistent therewith" (p. 3).

2. The Educational Point of View.

It has long been generally held and even quite recently stated on supposedly high authority that the chief function of a health department is the control of contagious disease. Usually the emphasis has been on preventive medicine, and on negative efforts to prevent sickness. A broader field is now being recognized—that of positive, constructive health work. Perhaps the most fundamental manifestation of this recognition of a new responsibility is the emphasis which modern health programs give to educational health activity. The sanitary supervisors in the reorganized health department of New York state are told to "promote the information of the general public in all matters pertaining to the public health" (p. 6); the local health officers have prescribed to them, as part of their duties, the promotion of the "spread of information as to the causes, nature and prevention of prevalent diseases, and the preservation and improvement of health" (p. 12).

3. The Constructive Work of Medical School Inspection.

This also illustrates a positive health attitude. The inspection is not only for the purpose of preventing disease, but is also aimed at the promotion of the vigor, vitality and efficiency of the school child.

4. A more rational distribution of effort and utilization of funds are characteristic tendencies of the new law in New York state. The health officers of the future may devote more time to social and sanitary surveys, constructive work among school children, the improvement of vital statistics and like endeavors, and waste less effort on the abatement of nuisances, the cleaning of chicken coops, and the removal of dead dogs.

On the whole the reorganization of the health department in the state of

New York was a very important step in advance, not only in health organization, but in social development. The movement, from its inception at an early conference with the new governor to the signing of the bill, was characterized by a broad social conception of duties and responsibilities. The law gives to the health organization a great degree of elasticity. Its potentiality for adaptation to special, unusual conditions is remarkable. Under the direction of a well-trained, broad-gauged health expert it should be an effective instrument in the hands of society's representative for the establishment of a more sound physical basis upon which we may build a more perfect social structure. For effective, creative health work the material and opportunities are bountiful; the knowledge and the means are at hand; the instrument, in the Empire State, at least, is but recently revised and modernized. There is a tremendous opportunity for a commissioner with an imagination and with an ideal to demonstrate that the most enduring basis for social evolution is the health of the people.

SOCIOLOGICAL ASPECTS OF RECENT REORGANIZATIONS OF HEALTH DEPARTMENTS, CLEVELAND, OHIO.

R. H. BISHOP, JR.,

Secretary Anti-Tuberculosis League.

Read before the Sociological Section, American Public Health Association, Colorado Springs, September, 1913.

At the present time, and for the last three years, Cleveland has had a health board composed of five members appointed by the mayor, for periods of one to five years. During this time there has been a greater growth and development of the city's health activities than ever before. A Tenement House Department has been organized and is in successful operation. A Bureau of Tuberculosis, employing twenty nurses and centering all the tuberculosis work in the city has been placed in operation. A Bureau of Child Hygiene, with the establishment of twenty prophylactic babies' dispensaries, and the employment of thirty nurses, is in operation. Full-time district physicians are being employed, a Bureau of Occupational Diseases is being organized and, taking it all in all, there is scarcely a city in the United States where a greater development of its health department has taken place in such a short time. And this, mind you, under a health board.

Early in the spring of the year, in accordance with the provisions of the newly adopted state constitution, Cleveland set about to provide itself with a new charter, and a commission of fifteen members was elected by the people to draft this charter and later submit it to them for their approval. One of the most perplexing and important questions that presented itself was "What shall be done with the health department?" Shall provision be made in the new charter for the operation of the health department by a board, insuring perhaps in certain instances health legislation in advance of public opinion and support—insuring, too, permanency in office—but, through this very arrangement of board control, separating the health department from other and closely related departments of the city government, making it independent of the mayor and city council. Or, shall the board be abolished, the provisions of the charter made uniform, and the health department and its activities brought into closer relationship with the activities of other departments and health legislation entrusted to the council?

The commission adopted the latter plan. Provision is made for the establishment of six departments:

- (1) Department of Law.
- (2) Department of Public Service.
- (3) Department of Public Welfare.

- (4) Department of Public Safety.
- (5) Department of Finance.
- (6) Department of Public Utilities.

Each department will be in charge of a director, appointed by the mayor; each division will be in charge of a commissioner, appointed by the director; and the officers under the divisions will be appointed by the commissioners, subject to civil service rules.

The Department of Public Welfare, the one we are particularly interested in, will have five divisions:

- (a) Health.
- (b) Charities and correction.
- (c) Recreation.
- (d) Research and publicity.
- (e) Immigration and employment.

This, then, is a brief statement of the old scheme of operation and of the new, which will go into effect on January 1, 1914.

What have been the objections to this new department, and what can we hope for in the development of it? There have been two main objections:

First, that the city council, either because of ignorance, indifference or political pressure, cannot be expected to enact the necessary health legislation;

Second, that the new plan of organization will not make for continuous service; in other words, the health department will be "thrown into politics."

It is not proposed in this paper to take up a discussion of these objections. The conditions in different communities differ, and a scheme of organization and operation that works successfully in one may be a failure in another.

In order that you may appreciate the advantages of the new arrangement, I have prepared in some detail the development of the various divisions of the Public Welfare Department. (See Charts II, III, IV, V and VI.) The black indicates that now in operation; the red is the development of the future.

During the last four or five years there has been tremendous activity in practically all our American cities in an attempt to more thoroughly understand and in part to provide remedies for the social and economic conditions which cause a large percentage of the high mortality, general debility, unhappiness, poverty and diseased moral conditions in all communities of any size. Charitable organizations of every description are in the field attempting to handle some phase of the problem and are demonstrating the value of their methods in the handling of the difficult medical, social and economic problems presenting themselves for solution.

As the work of these organizations has grown and developed, as the underlying causes have come to be more thoroughly understood, as more points of contact in the daily routine have been developed and greater

efficiency has come to be desired, there has come the realization of the absolute necessity of coöperation and correlation of effort. There has come a sincere appreciation of this fact, that the success and efficiency of any one organization is in direct proportion to the success and efficiency of every other essential organization in the field whose work touches theirs. There has come, too, as the size and extent of the problems facing us have come to be more thoroughly understood, a realization that some of these problems, not all of them, will be worked out only as they are put under public control and financed and developed in a large way as the situation may demand.

There are a number of communities where the public at large and the public officials have become sufficiently educated to warrant the transfer to the municipality of a large share of the work formerly under private control, and increased financial support and extension of the work have been the results. But, this one thought should be kept fully in mind; as we all prepare to shift these burdens, we should bend every effort to make possible the development under municipal control of every phase of activity—medical—social—which, in a limited way, we have demonstrated are essential in order to secure successful results.

In order that this point may be more thoroughly appreciated, let us, for example, analyze the steps necessary in the handling of a family in which there is a case of tuberculosis. The control and management of this disease, essentially a medical problem, heads up in the health department, because it is a communicable disease. Effective treatment requires that there be:

1. An examination in the dispensary.
2. The nurse visiting in the home instructing and making sociological investigation.
3. Adequate hospital or sanatorium accommodation for the patient.
4. A preventorium or open air school for anæmic and predisposed children.
5. The placing of children to enable their mother to work.
6. The finding of employment.
7. Temporary or prolonged material relief to supplement family income.
8. Detailed investigation of living and working conditions, with a view to determining the predisposing causes.

The development of the machinery to handle each one of these steps cannot take place under the health division, so they are developing in other divisions; hospitals, sanatoria and preventoria, under the charities and correction division; preventive measures, in the shape of playgrounds, public baths, etc., under the division of play and recreation; research work, undertaken and carried through in the division of research and publicity.

This development of social work under the municipality must of necessity be slow. Private organizations having interested the municipality in assuming burdens new to the municipality, their moral responsibility still

remains and, in a sense, is greatly increased as a result of the enlarged field of activity and the greater good to be accomplished.

Bear in mind that the Public Welfare Department is a provision of the charter of the city of Cleveland and is looking ahead twenty or twenty-five years. As a result of its organization there is bound to be some rearrangement of the publicly and privately controlled charitable work, but the municipality cannot in any large way undertake the work now being done by private organizations until it gradually demonstrates its ability to do the work as well, or better, than it is being done.

By the establishment of a division of immigration and employment we hope to get into closer touch with the future citizens of our city than we have been; make it possible for them to learn English; safeguard and help them from the time of their arrival instead of waiting to see how they will be able to make it without dependable aid and, for the most part, alone.

We are slowly awakening to the fact that health is a thing to be talked about. The conservatism and secrecy of the medical profession in regard to disease and its treatment are receiving scant courtesy in the face of the public demand for more detailed and accurate information concerning disease—what it is, and how to avoid it.

The publicity division will undertake a systematic education of every group of citizens in the city upon health matters, and through this division the public will come to see and appreciate the relationship that exists between health and methods of living, and that between working and recreating. Moreover, the public will come to a better appreciation of the medical, social and moral problems that confront the city as a whole. They will come to consider the Department of Public Welfare as the one department of this city government which deals with the problems concerning us as human beings, the right solution of which makes for longer and happier lives, and more useful citizens. Gradually we will get away from the old consideration of all matters of health from an individual standpoint and treat them, as in the city we must, as community problems. Instead of treating disease after it has developed, through coöperation and through correlation of all social, public and private effort, we will get a grip on the predisposing causes of disease and we will begin with the treatment of the cause at the beginning, instead of dealing with results at the end.

Whether the Public Welfare Department of the city of Cleveland succeeds will depend upon the same close interest and personal service of the group of workers who have made our private charitable work a success. With their coöperation, their moral support, the success of this new department will know no bound. Working shoulder to shoulder, the public official and the private volunteer, great strides can be made, disease can be eradicated, stronger and better men and women will be the result and Cleveland will come to be the best, the most wholesome of all cities in which to work and live. It will become, in very truth, "The City upon a Hill."

PROGRESS IN REORGANIZING THE MINNEAPOLIS HEALTH DEPARTMENT.

FREDERIC BASS.

Read before the Sociological Section, American Public Health Association, Colorado Springs, September, 1913.

THE CITY.

Minneapolis, sixty years ago an Indian reservation, today has one person for each seven acres, a population of 325,000 in fifty-three square miles. It has no densely crowded areas and no slums in the degree that such are found in many American cities; the most densely populated acre holds 164 persons. Sixty-three thousand families live in 43,000 dwellings, one and thirty-four hundredths families per dwelling.

Of the total population, 71 per cent. is native white and 28 per cent. is foreign white. The Negro, Indian and Mongolian population make up the remaining 1 per cent. Of the foreign-born white population 83 per cent. are from Canada and northern Europe, all hardy races. Southern Europeans, Negroes and Mongolians make up, therefore, less than 6 per cent. of the total population. There is an illiteracy of 2.02 per cent.; 65 per cent. of the children of school age attend school.

The city is beautifully situated upon the Mississippi River; it has extensive parks, equivalent to one acre for each one hundred persons, with excellent street railway facilities for reaching them. The climate is comparatively dry, the relative humidity averaging 74 per cent. and the annual rainfall twenty-nine inches. The death-rate of 10.44 per 1,000 is one of the lowest of the registration cities and may be accounted for by the favorable climate, the hardy and intelligent population and absence of overcrowding and slums.

THE CIVIC AND COMMERCE ASSOCIATION.

In 1911 there was formed by a committee of influential citizens of Minneapolis a league known as the Civic and Commerce Association, the aim of which was directed toward the unifying of efforts in the upbuilding of the city in civic and commercial affairs. It has at the present time a membership of approximately 2,000 men and is amply financed. The membership is organized into committees, among which is that on public health.

THE PUBLIC HEALTH COMMITTEE.

The Public Health Committee was organized in the winter of 1911-12 under the chairmanship of Dr. J. W. Bell. Among the members was Dr. F. F. Wesbrook, a former president of the American Public Health Association. The membership included about twenty business and professional men. At the first few meetings, various miscellaneous local affairs pertaining to the health department of the city were discussed.

There appeared to be no department of the city government which did not have some connection with the public health and the scope of the committee's work appeared to be that of investigating the entire city government and many private or semi-private activities as well. The building inspector's department had charge of sanitary construction in new buildings; the street commissioners, who were practically street foremen, one for each ward, cleaned the streets; the city engineer controlled the water and sewer systems; the health department spent 65 per cent. of its income collecting garbage and ashes, 10 per cent. more in smoke inspection,—three-fourths of the health funds for engineering work and but one-twentieth for the greatest problem in public health today, the prevention and suppression of tuberculosis; the Board of Charities and Corrections controlled the city hospital and the tuberculosis sanatorium. The Associated Charities and one life insurance company were doing practically all the tuberculosis visiting nurse work done in the city.

It was evidently necessary for the committee to limit its activities, so the chairman appointed a sub-committee on scope and method of work. The sub-committee brought in the following report, which was adopted;

“(1) That the work of the committee be for the present limited to the direct prevention of communicable diseases and the reduction of unnecessary mortality.

“(2) That the committee make a careful examination of the budgets and work of existing city boards and departments engaged in the direct disease prevention and prepare a practicable plan for the consolidation of this work and the coöperation of the departments concerned.

“(3) That a plan for the coördination of public and private efforts for public health be formed.

“(4) That the committee make a request from the Board of Directors of the Civic and Commerce Association for an allowance of \$2,000 for one year, this sum to be used for office rent, and the services of secretary and stenographer.

“(5) That the committee formulate a policy of publicity and education which shall be effective as soon as the services of a secretary are obtained.

“(6) That the committee plan to arrange the data collected so that a reasonable health budget with ample support may be presented to the next Board of Tax Levy.”

The first three recommendations defined the work to be done. The fourth recommendation the Board of Directors of the Civic and Commerce Association felt unable to accept and for that reason the fifth recommendation, that of formulating a policy of publicity and education, was necessarily delayed.

In May, 1912, the Woman's Club of the city voted to spend \$2,500 for a

survey of the health conditions in the city, and, knowing of the movement commenced by the Civic and Commerce Association, decided to join forces with that organization.

The work of collecting, analyzing and collating data appeared to be a task beyond the ability of the members of the committee to execute personally, so that it was decided to employ one or more experts to report upon the situation. In July of the same year, the services of Dr. Herman M. Biggs and Prof. C.-E. A. Winslow of New York were engaged, and in September a preliminary report was submitted to the Committee on Public Health. The committee then in a series of bi-weekly meetings, at which representatives of the various city departments concerned were invited to be present, discussed the recommendations of the preliminary report.

THE REPORT OF MESSRS. BIGGS AND WINSLOW.

In their report, Messrs. Biggs and Winslow reviewed the history and existing conditions in the city of Minneapolis and compared them with conditions in other cities. It was pointed out that twenty years ago, when the Minneapolis health organization came into existence, the main duty of a health department was to maintain decent conditions, to attend to nuisances, complaints and to attempt to control severe epidemics after their appearance.

It was shown that the control of the health department rested with the city council; that the council was an elective body and that on that account peculiarly susceptible to the influences which would militate against the efficient execution of the law. It was stated "an effective health department must act in legislative, executive and judicial capacity, it must act freely without outside influence and it must act quickly to meet many complex emergencies." The examination of the budget for 1911, showed that out of a total appropriation of \$122,900 but \$47,000 was used for health purposes, the remainder being used for collection and disposal of garbage and ashes.

The necessity for increased hospital facilities in the control of communicable disease was emphasized, as was also the ridiculous inadequacy of a total of forty-five beds in the contagious ward of the city hospital. The important subjects of tuberculosis, infant mortality, and medical school-inspection were adequately dealt with. The new filtration plant was recognized as being of the finest type of construction, so that the water-borne diseases had been practically abolished. The sources of milk supply were quite thoroughly reviewed, as were also the inadequate ordinances for their sanitary control. It was held that thorough dairy inspection supplemented by education should be prosecuted. The fact was noted that while there were approximately 45,000 improved lots in the city with 26,000 sewer connections, there were 17,500 privy vaults. The inadequacy of

the sewer system was commented upon. The garbage collection and disposal was examined and the work as compared with other cities of the United States was commended; the whole of this work, however, was declared to be an engineering problem and the recommendation was made that it be transferred to another department. It was stated "In order that the energies of the health department may be bent directly and profitably toward life saving with as little distraction as possible, we believe it to be essential that it be relieved of the work of garbage collection and disposal which might well be placed under the city engineer or some other department of the city government." The housing conditions were reported as requiring more rigid ordinances. The laboratory organization of the health department was commended as excellent and no adverse criticisms were made. The tabulation of vital statistics was found to be in accordance with the best practice.

Recommendations for the reorganization of the department were made. The first essential was held to be the creation of a small, independent expert board with adequate powers of control. It was recommended that a health commissioner should be the executive of this board and under his direction there should be five divisions, as follows: (1) communicable diseases; (2) sanitation and food inspection; (3) laboratories; (4) vital statistics and publicity; (5) hospitals.

The problems requiring the immediate attention of a reorganized health department were specifically stated as follows: (1) the enlargement of hospital facilities for the care of contagious diseases and sanatoria for the treatment of tuberculosis under the health department; (2) the increase in the number of tuberculosis nurses; (3) the establishment of four consultations in the city for the prevention of infant mortality; (4) the extension of the work of the medical school-inspection; (5) a new milk ordinance calling for pasteurization by the holding system of all milk not of certified grade; (6) the rapid elimination of privy vaults; (7) the extension of the work of the laboratory.

Action of the Committee. The report was received by the committee and with certain changes which local conditions apparently demanded was adopted. The important work before the committee appeared to be the framing of a law to be introduced into the legislature meeting in the winter of 1913. To this end the committee recommended to the board of directors that an attorney be employed to draw up a bill in consultation with the committee. A bill was accordingly drawn after a study and discussion of the health laws of about forty cities of the United States.

THE BILL.

The bill was entitled "An Act to Promote Public Health to Create Boards of Public Health and Hospitals, and Define Their Duties in Cities

of the First Class." In Section 1, the organization of the board was stated. It was to be appointed by the mayor who should be a member, all members to serve without compensation, two members to be physicians, both men and women eligible to appointment.

In Section 2, the general duties of the board in the conduct of its business were defined, such as the care of records, the employment of officers and agents, and the form of ordinances to be adopted.

Section 3 defined the police powers of the department and the delegation thereof to its employees.

Section 4 defined the scope of the duties of the board and is as follows: "It shall be the duty of the board to devise and adopt means and measures to promote the public health, to lessen infant and child mortality, to prevent the spread of communicable diseases and if possible exclude them from the city, to equip, maintain and conduct all existing public hospitals of the city, and to erect, equip, maintain and conduct from time to time such additional public hospitals as it may deem necessary, and to make, adopt, and enforce all rules and regulations and ordinances for the purposes aforesaid.

Section 5 was a specific enumeration of the powers mentioned in Section 4. Section 6 prescribed penalties. Section 7 gave to the board the power to levy upon all the taxable property of the city, a sum which should not exceed two mills upon the dollar, which would yield on the valuation of the city, at that time, \$440,000 per annum. In Section 8, the board was given the power to condemn unhygienic buildings. In Section 9, all existing ordinances of the city were declared to be in force until ordered repealed by the board. Section 10 gave to the board the right of eminent domain. Section 11 relieved the members of the board and its employees from liability from any act done in the good faith in an attempt to carry out the provisions of the act.

The bill as outlined, was approved by the board of directors of the Association, and given to the chairman of the Hennepin County delegation to the legislature, Minneapolis being situated in Hennepin County. The chairman was a member of the Senate.

LEGISLATIVE ACTION.

The bill was introduced into the Senate and immediately passed. It so happened that at the same time a number of bills allowing the issuance of bonds by the city were passed. It appeared that all this was done by the Senate, without consultation with the members of the House Committee, and considerable antagonism between the House and Senate members of the Hennepin County delegation developed. Although it seemed satisfactory that the bill had passed the Senate without opposition, the manner of its passing was unfortunate.

Immediately upon the passage of the bill by the Senate, the friends of "*personal freedom*" appeared before the House Committee in protest. The American League of Medical Freedom, particularly, became active, and printed copies of the bill with underlined and heavily leaded type were freely distributed, together with letters asking the receiver to influence his representative against the measure. Several hearings were held by the committee, and the active opposition appeared to be led by Christian Scientists and the osteopathic physicians. The osteopaths agreed to withdraw their opposition if the first section, the provision that two of the members shall be physicians, duly qualified and licensed to practise medicine under the laws of the state, could be eliminated. This was done, the Christian Science opposition was removed by adding to Section 4, the words; "provided, however, that nothing in this act shall be construed to empower or authorize the board to interfere in any manner with the individual's right to select the physician or mode of treatment of his choice, and provided further that nothing in this act shall be construed to compel any person or child without the consent of parent or parents, to submit to vaccination, inoculation, antitoxin, or other medicinal or other treatment, except the quarantine, segregation and isolating hereinafter provided for"; also the elimination in Section 5 of the words "to discover by the examination of premises and persons, and any other appropriate means, the existence of communicable diseases, to discover persons who have been exposed to communicable diseases," further the elimination of the entire subsection of Section 5, reading "to require persons suffering from or exposed to communicable diseases to submit to vaccination, inoculation, antitoxin, or other appropriate preventive or remedial treatment," and the sub-section of the same section, "to exercise similar powers for the promotion of the public health in relation to subjects not herein specified."

Apparently the active opposition to the bill had been removed, and in fact all of the open opposition was removed, and in a conference of the Civic and Commerce Committee with the Committee of the House, it appeared that there was no decided opposition. Information, later verified, was received that certain members of the city council, fearing loss of power, were quite active in their opposition to the bill. It seemed impossible to meet this proposition in any other way than by open argument. The committee had the strong support of the newspapers, and many favorable editorials appeared. At the same time, a furious wrangle appeared in the city council over the appointment of a new health officer; and after the health officer in power was removed, the wrangle still continued over the patronage of subordinates. In spite of all these favorable influences, the bill was not reported out of the committee, and consequently failed of passage.

It was evident that in the legislative committee, there was little knowl-

edge of the situation, and the members had little time during the session to study it. Under the circumstances, they had to take somebody's word and they naturally took the word of the members of their city council advisers rather than that of the Civic and Commerce reformers, in regard to the advisability of a health department change. Their principal argument was that too great a concentration of power would result, but the reply that the responsibility was likewise concentrated, in the mayor in this case, brought out the return that an excellent opportunity would be given the mayor to build up a political machine and thus remove the power from the people. The fallacy of this argument does not need comment, but the argument gained force because the existing mayor won his place by a narrow margin over the rising tide of socialistic votes; in fact he won his place by the abolition of the usual party line between Democrat and Republican. To vote such a mayor power would certainly alienate votes from members hoping to serve another session, as well as alienate the political support of members of the city council.

The Committee of the Civic and Commerce Association felt that in spite of its failure a considerable amount of work performed had been well directed, and that the failure was due more to lack of available energy than to lack of proper measures. The conclusion drawn was that the intimate relation of the municipal, county and state political interests was not thoroughly understood, but that in order to gain such understanding more time and patience would have been required than the members possessed. The second cause of failure was the lack of publicity and education. It was felt that of the mass of the people, very few realized the purpose and need of the measure, because of their lack of opportunity to review the facts, which might have been presented in an extended series of public meetings. Newspaper publicity was insufficient.

Several interesting occurrences followed the committees' efforts, all of which would tend towards increased efficiency of public health work by concentrating energy against the spread of communicable diseases: 1, The city council formally investigated the health department and removed the health commissioner, probably feeling that something was wrong with the personnel since a considerable amount of attention appeared to be given to the health department by the civic organizations of the city, although the system, and not the personnel was attacked, and this point was emphasized; 2, the city council divided the health department, separating the refuse collection and disposal from the health department proper and placing its management under a separate council committee, known as the Garbage and Crematory Committee; 3, the health commissioner, acting upon the recommendation of the committee, secured an opinion from the city attorney that the cost of collection of refuse might be assessed upon the property owners based upon the general theory of special assessments;

4, an opinion was secured from the city attorney that the admission and release of cases of communicable diseases from the city hospital should be certified by the health officer; 5, in the budget for 1913, the health commissioner recommended that eight nurses for the care of tuberculosis be employed instead of two as in the year before; 6, an attempt was also made to place the health officer upon a full time basis, previously his duties calling for a part of his time.

Minneapolis citizens will soon vote on a new charter. A Charter Commission has reported in favor of a commission form, and one of the commissioners proposed is a health commissioner whose duties will be practically those proposed in the bill advocated by the civic organization. The Charter Commission placed this provision in the proposed charter, at the request of the Civic and Commerce Committee, which is now awaiting the outcome of the people's vote. If this charter succeeds in passing, Minneapolis will have a chance of an ideal health department; if it fails, the efforts to amend the present charter will be continued until the fight is won.

NOTE: Since writing this paper the Commission Form of Charter has been voted upon and rejected by the citizens by a 3 to 1 vote.

BACTERIOLOGICAL METHODS FOR MEAT ANALYSIS.

JOHN WEINZIRL and E. B. NEWTON,
Bacteriological Laboratory, University of Washington.

Read before the Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

The bacteriological analysis of meat, especially for securing quantitative results, appears to be employed rather infrequently, judging from the meagreness of the data available. Apparently each worker has devised his own technique, while no particular attention has been given to the technique as such. The writers undertook the investigation of certain problems relative to meat, and of necessity had to work out the technique best adapted to the purpose. It has seemed worth while to record the study thus made in order that others may profit by our labors.

When this investigation was undertaken only one described method was available to us, viz., in the work of St. John in his bacterial studies of poultry (Bul. 115, Bu. of Chem., 1908). The skin was seared and removed; then small fragments were torn from the muscular tissue. These fragments, weighing from 0.3 to 0.7 grams, were placed in 25 cc. sterile erlenmeyer flasks having the bottom covered with a layer of crushed glass and containing a definite quantity of physiological salt solution. The flask was shaken for ten minutes to dislodge the organisms. Definite quantities were then added to plain and to glycerine neutral agar. Plates were made and incubated at 37°, 20° and 1.67°C.

Since our work has been completed, there has come to our attention the second edition of Eyre's Bacteriological Technique (July, 1913) which also gives a method for meat analysis. The method differs materially from that given by St. John. The meat is minced by means of sterile scissors and forceps, placed in flasks, and bouillon added, but no glass is used. The flasks are then incubated at 42° C. for thirty minutes, shaking from time to time, or better still using an electrical shaker. Portions are inoculated into gelatin or agar and incubated at 37° C.

METHOD OF SAMPLING.

The proper sampling of solid substances is always a difficult matter; in the case of hamburger steak, a number of analyses might be made and the highest count obtained, used. To obviate the labor of making several analyses, we selected fragments from three different portions of the sample to be analyzed, and in this way secured something of an average. A number of trials showed that different portions of the same sample varied from 10 to 20 per cent., but might vary as much as 50 per cent. The sampling of

other meats is still more difficult. We would suggest that the portion to be analyzed be taken from the part showing most advanced decay as indicated by the organoleptic test. Only muscle tissue should be analyzed, all fat being discarded as tending to hold the bacteria from forming an emulsion.

PREPARATION OF THE SAMPLE.

In the present investigation, a method previously devised by Russell and Weinzirl (*Cent. f. Bakt. Abt. II Bd. III*, p. 456, 1897) for the bacteriological analysis of cheese, was employed. The essential point of this method consists in triturating the meat in a mortar with sand by means of a pestle. After grinding the meat with sand for some time, a small amount of sterile salt solution is added and the grinding continued; finally the volume of the salt solution is brought to 100 cc. and the whole thoroughly mixed. Suitable dilutions are made and portions plated as usual.

The sand is sterilized in test tubes, approximately 5 grams being used to each sample. The mortar and pestle may be sterilized in the usual way, or more conveniently thoroughly flamed and allowed to cool before using. In a quiet atmosphere the number of bacteria falling into the mortar during the time of preparing the sample for the dilutions is so small as to be negligible as shown by many analyses of perfectly fresh meats:

Several trials by the shaking and the triturating methods were made and the results are given in Table I below:

TABLE I.
GIVING COMPARATIVE BACTERIAL COUNTS FROM MEAT BY THE SHAKING
AND GRINDING METHODS.

No.	Bacteria per gram of meat by:	
	Shaking method.	Grinding method.
1	1,050,000	35,000,000
2	6,200,000	51,000,000
3	2,700,000	22,000,000

The trials are too few, but they apparently favor the grinding method. No doubt with experience more favorable results could be obtained with the shaking method, but it is quite obvious that many bacteria must be left in the tissue, especially when it happens to contain much connective tissue.

DILUTIONS USED.

Apparently other workers have employed low dilutions, usually 1 to 100 and using 1 cc. and fractions of a cc. for plating. If plates are to be secured which meet the requirements of the standard methods, viz., between 50 and 200 colonies for a 100 mm. plate, then a series of dilutions must be made, and duplicate plates made from each. Experience alone will enable the analyst to estimate the probable number of bacteria present in the sample and to calculate the necessary dilutions. For fresh meats, dilutions of 1:100 and 1:1,000, will usually suffice, but for more questionable samples 1:10,000 and 1:100,000 are necessary, and 1:1,000,000 is advisable.

MEDIA EMPLOYED.

For quantitative purposes both gelatin and agar are available. The tendency of analysts is away from the gelatin and to substitute agar whenever possible. With this tendency the writers are in hearty sympathy, and hence nearly all our work has been done with agar medium.

Assuming that meat broth and peptone are to be used in the usual proportions, two questions then present themselves, viz., what percentage of agar, and what reaction, are the most favorable? As to the percentage of agar, the present tendency is to use either 1.5 or 1 per cent. Accordingly we attempted to determine which of these gave the more favorable results. The results obtained are given in Table II below:

TABLE II.

COMPARING BACTERIAL COUNTS ON 1 PER CENT. AND 1.5 PER CENT. AGAR.

No.	Dilution used.	Bacteria per gram in:	
		1% agar.	1.5% agar.
1	1:80,000	19,800,000	22,400,000
2	1:250,000	81,800,000	95,900,000
3	1:100,000	33,500,000	35,000,000
4	1:100,000	32,500,000	51,000,000
5	1:100,000	30,000,000	37,500,000
6	1:100,000	25,000,000	28,500,000
7	"	18,500,000	43,500,000
8	"	2,800,000	3,800,000

All the samples were hamburger steak secured in the markets. As the data show, there is a marked difference in the counts in favor of the 1.5 per cent. agar. In our work 1 cc. of the dilution was invariably added to each plate, while the amount of medium approximated 10 cc. Under these conditions the 1 per cent. agar gave poorer plates for working than

did the 1.5 per cent. agar. The colonies were generally less well defined, and the loss by spreaders was greater. These conditions lead us to adopt the 1.5 per cent. agar as the more desirable.

With respect to the reaction, 0, +1.0, +1.5 and +2.0 were tried out, and the results are given below:

TABLE III.
GIVING COMPARATIVE BACTERIAL COUNTS AT DIFFERENT REACTIONS.

No.	Bacteria in millions per gram with reaction:			
	0	+1.0	+1.5	+2.0
1	15.5	12.8	....	11.3
2	9.4	12.7	....	14.2
3	5.6	3.2	....	4.9
4	5.5	10.0	11.5	12.2
5	4.6	8.2	10.6	10.2
6	12.5	16.2	18.7	35.0
7	52.	72.	64.	80.
8	17.7	35.	42.5	47.5
9	13.2	8.8	30.	25.
10	22.	36.	35.	33.7
11	7.4	10.2	8.6	10.0
12	3.5	5.2	3.2	5.2
13	10.5	....	22.0	27.5
14	1.4	1.0	1.2	2.0
15	1.5	....	....	3.7
16	4.3	3.0	4.2	6.4
17	19.	15.	26.	34.
Total	210.6	261.4	277.5	353.1
Average	12.3	17.4	21.3	20.8

Apparently different samples of meat give higher results with varying amounts of acid in the medium. This may be accounted for on the assumption that the flora varies quite widely in different samples, or it may be largely due to a considerable factor of error inherent in the work. If the results for each reaction were averaged, and these averages compared, then the highest figure is obtained with a reaction of +1.5. This reaction is the one adopted by the committee on standard methods for milk analysis, and since milk and meat are both highly proteid, we should expect that the same reaction would be most favorable for both. On the basis of the results secured, and because the figure agrees with one already standard, we adopted +1.5 reaction for our work.

TEMPERATURE OF INCUBATION.

The two standard temperatures, 20 and 37° C., are usually employed simultaneously. Since we were not interested in pathogens but simply in bacteria causing putrefaction, we used room temperature or 20° C. This is in harmony again with one of the temperatures permitted by the committee on milk analysis. In reality we prefer 28° C., the optimum for most saprophytes, and regret that this temperature is not more commonly used. By using 28° the time may be shortened by half, which is an important advantage.

STANDARD FOR CONDEMNATION.

At the present time the only standard for condemning meat is the "organoleptic" test or condemnation by smell, appearance, feel, etc., and the ammonia test. In another paper we have attempted to establish a bacteriological alternative for these. Briefly we find that no bacteriological equivalent can be established for either the organoleptic or ammonia test, but an arbitrary standard must be chosen if one is to be set up at all. This is exactly what is done for milk and there is no valid reason why the same should not be done for meat. We suggest 10,000,000 bacteria per gram as the limit for sanitary purposes.

SUMMARY.

To summarize the results of the investigation, we find that the method of triturating the sample of meat with sterile sand in a mortar is both simpler and more efficient in securing an emulsion, than the method of shaking with glass; and that the methods given by the committee on "Standard Methods for Milk Analysis" are also best adapted for meat analysis so far as they apply, viz., the use of agar, +1.5 acid, and incubation at 20° C. However, 1.5 per cent. agar was found to be preferable to 1.0 per cent.

BACTERIOLOGICAL ANALYSES OF HAMBURGER STEAK WITH REFERENCE TO SANITARY STANDARDS.

JOHN WEINZIRL and E. B. NEWTON,
Bacteriological Laboratory, University of Washington,

Read before the Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

The condemnation of meats by sanitarians rests upon uncertain foundations. The commonest basis employed is the "organoleptic" test, *i. e.*, testing by the senses of sight, smell, feel, and perhaps taste. For general purposes a judgment based upon such a test may be quite satisfactory; still occasions arise when a more accurate and, if possible, more scientific test would be highly desirable. Every meat inspector, no doubt, longs at times for additional proof of the unfitness of the meat he has condemned; and especially is this true if the case is taken into court, when the lack of definiteness in the organoleptic test becomes only too apparent.

The meat inspectors have appealed to the chemists for aid, but thus far the appeal has been in vain. True, we have the Eber test for ammonia, a test which is easily and cheaply made, but which is of little value when made because meat which responds to this test is so plainly rotten that few merchants would offer it for sale and none probably would resist its condemnation.

The Food Commission of the State of Washington have occasionally appealed to the bacteriologist for aid in the condemnation of meats. A considerable number of analyses of meats of various kinds have been made in the bacteriological laboratory of the State University. Such analyses appeal to the sanitarian because of their definiteness and apparent accuracy. Certainly they aid materially in securing convictions, if a definite standard or limit for bacterial content is set up. If the meat is teeming with bacteria it is apt to be regarded as potentially rotten if not actually so, and the court is also likely to assume that the bacteria are potentially disease producing, and, therefore, a favorable decision for the inspector is almost certain.

[It is comparatively a simple and easy matter to analyze meat bacteriologically; withal, our methods of analysis are fairly satisfactory and could easily be made standard. The trouble does not lie in this direction, but rather in the direction of establishing a limit for the bacterial content.] If a definite limit could be established, such as cities have established for milk, then all would be easy. Logically there is no more reason for establishing one of these limits than for the other. That it is more easily done

in the case of milk, all will agree; but that it is of greater legal force is most unlikely.

So far as the writers are aware only one attempt has been made to set up a bacterial limit for meat, viz., the limit of 1,000,000 bacteria per gram, by Marxer (cited by Edelmann, Meat Hygiene, 2nd Ed., 1911, p. 325) as indicating putrefaction. This standard agrees well with the usual standards for milk, and on *a priori* grounds a gram of meat teeming with 1,000,000 bacteria of questionable character would seem to be unfit for human food. Unfortunately there are certain difficulties in the way of accepting this conclusion.

It is the purpose of this investigation to determine: (1) whether the Marxer standard is justifiable; (2) if the Marxer standard is not justifiable, then can a better one be established. To this end we undertook the examination of market hamburger steak, because (1) it would be most likely to furnish considerable numbers of bacteria; (2) it would be interesting to know what numbers of bacteria were actually present in hamburger; (3) hamburger steak is usually made from scraps of meat collected during the day from trimming of the steaks sent out; hence it is inferior meat, waste practically, and may be classed along with sausage. It is, therefore, regarded by most housewives as unfit for food. Apparently it would afford a vulnerable point of attack; (4) it would seem to be easier to set up a provisional standard for hamburger than for other meats, since the penetration of bacteria through the entire mass is more uniform; and finally (5) if we condemn meat at all on bacteriological grounds, should we not condemn hamburger first of all?

THE NUMBER OF BACTERIA IN MARKET HAMBURGER STEAK.

After working out a suitable technique as given in another paper, quantitative bacteriological analyses were made of forty-four samples of market hamburger steak. Most of the analyses were made during the cooler months of the year, hence the results are more favorable than would have been secured had the samples been taken during the summer. Again, the temperature for Seattle is more favorable for keeping fresh meat than it is in eastern and southern cities, although its winter climate is relatively warmer than that of northern cities. The results of our analyses are given in Table I.

The striking feature of the table is that all but four of the samples exceed 1,000,000 bacteria per gram, and, therefore, according to Marxer, nearly all hamburger would have to be condemned. On the basis of the "organo-oleptic" test practically all the samples would pass muster. It is obvious that the two tests are far from agreeing.

Some of the samples were held until they responded to the Eber or am-

TABLE I.
GIVING BACTERIAL ANALYSES OF MARKET HAMBURGER STEAK.

Sample.	Date.	Organoleptic Test.	Bacteria per gram of meat.	Bacteria exceed 1,000,000.	Bacteria exceed 10,000,000.
1	Nov. 9	Good	3,700,000	+	—
2		Good	470,000	—	—
3	16	Bad	14,900,000	+	+
4	Dec. 7	Good	2,600,000	+	—
5	20	Good	12,600,000	+	+
6		Good	11,800,000	+	+
7	28	Fair	8,500,000	+	—
8	27	Fair	11,800,000	+	+
9		Fair	30,500,000	+	+
10		Good	29,200,000	+	+
11		Good	4,500,000	+	—
12		Good	1,200,000	+	—
13		Fair	21,200,000	+	+
14		Good	17,600,000	+	+
15	Jan. 11	Fair	77,200,000	+	+
16		Good	7,700,000	+	—
17		Good	19,800,000	+	+
18		Good	14,600,000	+	+
19	Feb. 1	Good	11,400,000	+	+
20		Fair	5,500,000	+	—
21		Good	3,100,000	+	—
22		Good	5,300,000	+	—
23		Good	3,400,000	+	—
24		Good	5,500,000	+	—
25		Fair	2,100,000	+	—
26		Good	3,800,000	+	—
27	14	Excellent (fresh)	269,000	—	—
28	15	Fair	770,000	—	—
29		Fair	4,200,000	+	—
30		Fair	3,800,000	+	—
31		Fair	520,000	—	—
32		Good	21,000,000	+	+
33		Fair	88,800,000	+	+
34	July 16	Poor	81,800,000	+	+
35	25	Fair	1,600,000	+	—
36	29	Good	35,000,000	+	+
37		Good	51,000,000	+	+
38		Good	22,000,000	+	+
39		Fair	37,500,000	+	+
40		Poor	28,000,000	+	+
41		Fair	13,700,000	+	+
42		Good	8,000,000	+	—
43		Fair	43,500,000	+	+
44		Good	3,800,000	+	—
		Freezum			

monia test, and then analyzed bacteriologically to determine if possible the bacterial equivalent of this standard. The results are given in Table II:

TABLE II.

GIVING THE NUMBER OF BACTERIA PER GRAM CORRESPONDING TO THE ORGANOLEPTIC AND AMMONIA TESTS.

No.	Organoleptic test.	Ammonia test.	Bacteria per gram.
1	Bad	..	63,600,000
2	Bad	..	30,000,000
3	Bad	..	7,500,000
4	Bad	..	20,000,000
5	Fair	..	2,100,000
6	Fair	..	6,600,000
7	Bad	+	5,000,000
8	Bad	+	15,600,000
9	Bad	+	23,400,000
10	Bad	+	22,300,000
11	Bad	+	25,500,000
12	Bad	+	25,600,000
13	Bad	+	62,500,000
14	Bad	+	525,000,000
15	Bad	+	127,000,000
16	Bad	+	150,000,000
17	Very Bad	+	112,500,000
18	Bad	+	132,500,000
19	Very Bad	+	187,000,000
20	Very Bad	+	187,500,000
21	Very Bad	+	232,500,000
22	Bad (freezum)	+	120,000,000

It should be noted that the first thirteen analyses were of winter samples, while the remaining nine were of summer samples. All the summer samples showed upward of 100,000,000 bacteria per gram, while the winter samples all showed less than this figure. In some of the summer samples ammonia undoubtedly was present some hours before the test was made, but it is also true that in two instances (Nos. 16 and 22) ammonia was slight and was only discovered after repeating the test; No. 22, however, was found to contain sodium sulphite.

If we average the results of all the samples showing ammonia (7 to 22), we have 125,000,000 bacteria as the equivalent of the ammonia test; if we separate the winter (7 to 13) and summer samples (14 to 22), then we have approximately 25,000,000 and 200,000,000 respectively. From the figures

available, it is manifestly impossible to determine a fair bacterial equivalent for the ammonia test. It would also appear that in warm weather, bacterial or enzymic action lags behind bacterial reproduction. If this inference proves to be true, then we have an added difficulty in setting up a bacterial standard for meat. Parenthetically we may ask the question whether a single standard for milk for both winter and summer is really justifiable.

We attempted also to determine the number of bacteria present in hamburger when the organoleptic test would condemn the samples. Table II includes the organoleptic test for spoiled meats. There is no close agreement between the number of bacteria present and the degree of spoiling as judged by this test. Roughly, 25,000,000 bacteria are present in the winter when the nose condemns, and perhaps 200,000,000 in the summer marks the same point. In a general way, the organoleptic and ammonia tests agree, although the latter probably lags behind somewhat.

COMPARISON OF SANITARY STANDARDS FOR MEAT.

If we compare the various standards or tests, we find the following:

1. The Marxer standard of 1,000,000 bacteria per gram as a limit appears to be too low, since nearly all samples of hamburger would be condemned by it, even though they show no taint or evidence of putrefaction otherwise. We have also analyzed samples of other market meats all of which would pass inspection, and have frequently found them to exceed this limit. The same is true regarding some of the samples of poultry analyzed in the Bureau of Chemistry and reported in Bulletin No. 115.

2. The organoleptic and the ammonia tests agree fairly well, although the latter appears to lag behind somewhat. In general these tests appear to be too liberal, for the meat is actually putrid and literally teems with millions of bacteria per gram before it responds to them. It would seem that a stricter standard would be desirable.

3. In view of the above considerations, we would propose a bacterial standard of 10,000,000 per gram as the limit. This is a tremendous rise over Marxer's figure, but on this basis 50 per cent. of our market samples of hamburger would still be condemned. The condemning of so large a proportion of hamburger can be justified on the following grounds: (a) much of it is actually spoiled when it reaches the consumer or is to be cooked; (b) meat teeming with 10,000,000 bacteria per gram is potentially rotten and soon will be actually spoiled under ordinary methods of handling; (c) the fact that markets are prone to add sodium sulphite to hamburger, even though the dealer knows it to be contrary to law, indicates that something is wrong with the hamburger; (d) finally, if hamburger were made from wholesome meat in the first place, then kept properly iced, we believe that the bacterial content could readily be held within the 10,000,000 limit.)

REPORT OF A MILK-BORNE EPIDEMIC OF DIPHTHERIA.

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Read before the Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

In the latter part of April of the present year an unusual number of cases of diphtheria began to be reported in a restricted section of the city of Lincoln. On April 21, nine cases were reported in three families. In one family there were four, in another three, and in the third two cases. On the 22d seven more cases were added and at this time the observation was made that they were all reported from families which obtained their milk from the same dairy. On the 23d an investigation of this dairy was made by City Health Officer, Dr. John F. Spealman.

This investigation disclosed the following facts: On Sunday, April 13, Mr. J. consulted a physician for a sore throat. The physician whom he consulted told him that his throat looked suspicious and suggested that Mr. J. should be seen again on the following day. Mr. J. requested that the physician should not come unless called again. The physician was not called at any subsequent time.

On Tuesday, April 15, Mr. J. began work at the dairy which was shown later to be the source of infection in this epidemic. On April 23, cultures were taken from the throats of both Mr. and Mrs. J. and these showed diphtheria bacilli on April 24. At this time there was no membrane in the throat of Mr. J. In the throat of Mrs. J. there were well-defined patches of membrane on the tonsil and adjacent parts of the pharynx.

Mr. J. confined his activities to the dairy, getting his meals at home. He did not enter the house of the dairyman, his duties not requiring such entrance. He assisted in milking and poured the contents of his pail into a common container where it was mixed with the rest of the output of the dairy. Mr. J. and his wife were at once quarantined and the dairy was ordered to stop selling milk on April 23. This order resulted in the permanent closing of the dairy. Inspection of this dairy showed that it was otherwise excellent from the sanitary standpoint.

The following table, No. I, shows the number of cases of diphtheria reported in days on the milk route of the dairy which was the cause of the outbreak.

The cases reported on May 14, 24 and 26 were not reported when the illness began. The one reported on the 14th gave a history of having had a sore throat for about three weeks. This sore throat had been diagnosed

tonsillitis by the attending physician and was found to have been diphtheria when positive cultures were obtained from his throat on the 14th of May. The two cases reported on May 24 and 26 were in the homes of Christian Scientists and had existed for approximately a month.

In Table No. I has been included one case as being reported on April 24. This case was reported from the death certificate on this date, diphtheria being included in the statement concerning the cause of death. This individual had used the milk from the infected dairy before and during her illness which began about a week before her death. Antitoxin was administered in a dose of 5,000 immunity units when she was practically moribund. Death occurred four hours after the administration of the antitoxin. This was the only death which occurred in those who were treated with antitoxin. In all there were 110 cases in which there was a definite history of the use of milk as a beverage. Not a single death occurred in

TABLE I.

Day of month.	1913. April cases.	Day of month.	1913. May cases.
21	9	3	1
22	8	6	1
23	6	14	1
24	32	24	1
25	14	26	1
26	16		—
27	5		5
28	9		
29	2		
30	4		
	105	Total.....	110

97 who received antitoxin on the first days of their disease. Of the 12 who did not receive antitoxin one died. There were only two deaths resulting from this epidemic, or a death-rate of 1.8 per cent. The case in which antitoxin was not given until the patient was moribund should not be included with those who had antitoxin early. This would make the death-rate 0 among those who received antitoxin. The death-rate in those who did not receive antitoxin was 8.33 per cent. If the patient who did not receive antitoxin until she was moribund were to be regarded as properly belonging to the group which did not receive antitoxin the death-rate for the latter would be 15.4 per cent. In addition it should be stated that the disease was reported as mild in all of those who did not get antitoxin with the exception of the case in which death occurred.

Of the 110 cases which are included in this report 109 revealed diphtheria bacilli. No culture was made in the one instance where death and diagnosis were almost synchronous.

The dairy which supplied the infected area furnished milk to about 15 per cent. of the families living in this section. In all 301 families were supplied, diphtheria developing in 79 of them, a percentage of 26.24. In these 79 families there were 110 cases. There were two cases in 18 families, three in 5 families and four in one family. In this area there occurred during this period only four other cases. These four individuals were reasonably sure that they had not partaken of this milk. Two of the four gave a clear history of intimate contact with individuals who had diphtheria at about the same time. The other two did not give any history of known contact.

In all the rest of the city during this period six cases were reported. Of these two gave a very definite history of contact with diphtheria patients. All of these six individuals were reasonably certain they had not partaken of this milk.

The following table gives the ages of cases arranged according to sex:

Age in years.	Number of cases.			Age in years.	Number of cases.		
	Male.	Female.	Total.		Male.	Female.	Total.
0-4	4	4	8	40-44	1	2	3
5-9	6	13	19	45-49	2	4	6
10-14	14	5	19	50-54	0	1	1
15-19	7	3	10	55-59	0	2	2
20-24	7	9	16	60-64	0	1	1
25-29	2	6	8	65-69	0	0	0
30-34	1	5	6	70-74	0	2	2
35-39	2	7	9				
				Total	46	64	110

There occurred in the period 0-24 years in males 38 cases and in females 34 cases. In the period 25-49 years 8 cases occurred in males and after this date none. In the period 25-49 years 24 cases occurred in females. In females there were 6 cases over 50 years of age, one being 72 and another 74.

This epidemic, like milk-borne typhoid fever epidemics, shows the greatest incidence in women and children. This is to be explained in the same way as in typhoid fever, namely, a greater consumption of milk by women and children than by men.

In the 79 families from which diphtheria was reported, there were 337 individuals. Nearly all of these had partaken of the milk from the infected dairy. Of the 337 individuals, 110 had diphtheria or 32.64 per cent.

The severity of the disease in those infected was reported as follows:

Very severe.....	13
Severe.....	20
Moderately severe.....	46
Mild.....	31

Total.....110

This would indicate that the disease in this epidemic was of about the average severity.

The following table shows the number of individuals receiving antitoxin as a therapeutic measure and the number of immunity units administered.

Immunity units.	Number of cases.	Immunity units.	Number of cases.
1,000.....	4	9,000.....	2
2,000.....	2	10,000.....	7
3,000.....	21	11,500.....	1
4,000.....	5	12,000.....	1
5,000.....	29	13,000.....	1
5,500.....	1	15,000.....	3
6,000.....	3	17,500.....	2
7,000.....	3	18,500.....	1
7,500.....	1	20,000.....	1
8,000.....	5	30,000.....	2
8,500.....	1	52,500.....	1
		Total.....	97

Thirteen of those who were ill received no antitoxin. The smallest dose given as a curative measure was 1,000 immunity units. This was given four times. Three of the patients receiving this dose were children, one of them being only four and one-half months old. One of the two receiving 30,000 units was very ill. A paralysis affecting the soft palate and the vocal cords developed which lasted nearly two months. The patient who received 52,500 units also had a paralysis which affected the vocal organs. Three weeks after the beginning of her illness there developed a paralysis which affected all the muscles of the trunk and extremities. The alimentary tract was also affected. Incontinence of feces and involuntary vomiting continued for several weeks. The urinary tract was not involved. This patient is now beginning to convalesce but is not yet able to walk.

Of the 227 individuals in the 79 infected families who did not have diphtheria, only 78 received prophylactic doses of antitoxin. Nearly

all of those who received prophylactic doses were children. The amount given varied from 500 to 5,000 immunity units. The majority received 1,000 units.

Rash was present in 26 instances in the 175 to whom antitoxin was administered or in 15 per cent. of those receiving it. It occurred with about equal frequency in both therapeutic and prophylactic administration. In one instance there was swelling of the cervical and axillary glands. No other disturbance was recorded in any person who received antitoxin.

In order to obtain an approximate estimate of the loss entailed during this epidemic the following questions were sent out by the Health Office. Replies were obtained from three-fifths of those to whom the questions were addressed. The replies to these letters form the basis for an estimate of the loss sustained by all the families in which the disease existed. The questions were as follows:

What was the expense for antitoxin?

What was the expense for other drugs?

What was the expense for nursing?

What was the expense for medical treatment?

What was the expense for other incidentals?

What was the expense for board of those away from home?

What was the money value for loss of time?

How many days were lost in school?

The figures compiled from these data added to the loss entailed by the closing of two dairies and the extra expense which the epidemic placed upon the Health Department show an approximate economic loss of \$10,000. This estimate does not include the loss sustained through the two deaths which occurred.

The early discovery of the source of infection, the prompt closing of the dairy, the release from quarantine after negative cultures were obtained and the early use of antitoxin limited the epidemic and brought it to a quick termination. That its termination was complete is evidenced by the fact that practically no cases of diphtheria have occurred in the city since the middle of May.

A STUDY OF CALCIUM HYPOCHLORITE AS A DISINFECTANT OF WATER.

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A number of different methods of water sterilization have been devised during the last decade or so, but few of them have proved to be commercial successes. The most successful method from a cost efficiency standpoint appears to be the hypochlorite process. Hypochlorites have long been recognized as powerful disinfectants, but it was not until the early nineties that the calcium and sodium compounds were used to any considerable extent as disinfectants of water. This method of sterilization by hypochlorites, however, has been criticised considerably from time to time. It has been claimed that treatment with calcium hypochlorite or chlorid of lime, as it is commonly called, imparts a decided taste and odor of chlorin, and that the hypochlorite remains in the water for a considerable time after application of the "bleach"; also that the hardness is increased; that there is considerable "after growth" of bacteria, and that this growth is objectionable in character. It was in order to obtain data in regard to these points of objection and because of frequent requests received by Dr. M. P. Ravenel, director of the State Hygienic Laboratory, for information in regard to the efficiency of calcium hypochlorite as a disinfectant of water that the experimental work, involving the treatment of waters of various qualities from different parts of the state, was undertaken.

The purpose of using disinfectants is to remove undesirable bacteria from the water, and it is obvious that any method combining the desirable qualities of efficiency and economy would prove of great value in the production of a safe water supply, either as a permanent method of disinfection, or a temporary remedial method, or as an adjunct to filtration. The different substances which have been proposed for use as sterilizing agents are heat, lime, ozone, permanganates, copper and its compounds, and chlorin and its compounds, the hypochlorites.

Still other methods have been devised using hydrogen peroxide, barium peroxide, chlorin dioxide and bromin and chlorin together. These substances effect the necessary sterilization by the action of nascent oxygen, liberated in the presence of organic matter, and have produced very good results; but, because of the expense involved, which is comparatively large, treatment of water with the above mentioned materials has not been extensive.

HYPOCHLORITES.

Hypochlorites have long been recognized as powerful and efficient dis-

infectants. The sodium and potassium salts have not been generally employed on a large scale because of their relatively high cost, but calcium hypochlorite has been rather extensively used. Calcium hypochlorite or chlorid of lime, also known as "bleaching powder," contains from 30 to 40 per cent. of available chlorin. The hypochlorite dissolves in the water leaving a residue, composed mainly of calcium hydrate and calcium carbonate. Many investigators have studied the action of calcium hypochlorite on specific bacteria and the results of numerous experiments conclusively indicate that relatively very small amounts of available chlorin are sufficient to destroy vegetative bacterial life. The disinfecting efficiency is dependent on the amount of organic matter present, the time of exposure, and the concentration of available chlorin in the solution. From an economical view point, a detailed study of results on a cost basis leaves no doubt that the efficiency of calcium hypochlorite is much greater than that of the other germicides mentioned.

NATURE OF HYPOCHLORITE PROCESS.

This process is essentially one of oxidation, by which objectionable bacteria in water under treatment are destroyed. This compound, commonly spoken of as chlorid of lime, is really a mixed salt of calcium, containing calcium chlorid, calcium hypochlorite, calcium carbonate, calcium hydrate, and a small amount of inert material. The bleach or chlorid of lime dissolves in water, leaving a residue composed chiefly of calcium hydrate and calcium carbonate; the calcium chlorid remains inert and ineffective, and it is the hypochlorite which alone serves as an oxidizing and sterilizing agent.

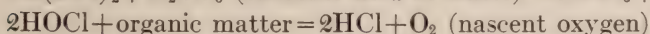
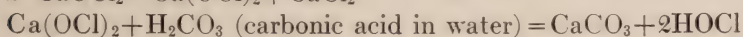
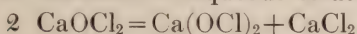
The dissolved calcium hypochlorite reacts with the free carbonic acid and half bound carbonic acid in the water and there is formed calcium carbonate, and at the same time free oxychlorid, which is known technically as hypochlorous acid. This latter compound is spoken of as an acid, but it is a very weak acid, as is shown by the fact that in the atmosphere the hypochlorite is decomposed by the weak carbonic acid contained in the air, and there is set free hypochlorous acid in a manner corresponding to that which takes place in the treatment of water.

While hypochlorous acid is an extremely weak acid, it is well known to chemists that it is a powerful oxidizing agent. It effects oxidization, in the presence of organic matter, by virtue of the liberation of nascent oxygen in consequence of its instability. It is well to mention that this treatment is in no sense a chlorin treatment such as is sometimes spoken of, and largely because of the use of the same commercial product in bleaching operations. In bleaching, the commercial product is treated with a strong acid which does break up the chemical and release free chlorin. Even free chlorin is not of itself an oxidizing agent, but in the presence of

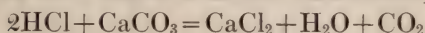
water it combines with hydrogen and this sets free oxygen in the nascent or atomic state.

The weak carbonic acid in water is entirely incapable of releasing free chlorin; but instead there is produced hypochlorous acid which gives up its oxygen in the presence of organic matter. Hypochlorous acid is not a poison. The chlorin of this compound combines with the alkaline substances of the water, forming principally calcium chlorid.

The reactions in aqueous solutions are as follows:



The HCl reacts with the carbonates; forming chlorids.



It is this atomic or nascent oxygen which acts as the disinfectant and produces oxidation.

The principal substances or compounds in water which are capable of oxidation under suitable conditions are those generally spoken of as organic matter. Some of this organic matter is dead, disintegrating or dissolved, and some of it is living organic matter, comprising bacteria, small micro-organisms, certain forms of algæ, diatoms and the like.

There are also some mineral compounds in water which may be oxidized under suitable conditions. They are present as nitrogen in the form of nitrites, and iron in the form of ferrous salts. Another compound which is capable of passing into a higher form of oxidation is that of nitrogen as free ammonia, and which exists in water, for the most part, in the form of ammonium carbonate.

In speaking of the treatment of water with chlorid of lime, it should be borne in mind that the quantity of hypochlorite used is very small, not more than a small fraction of one grain to a gallon of water. The significance of these dilutions has considerable importance in properly understanding the process and the merit of its practicability.

It is ordinarily said that dead organic matter is present in water either in a dissolved or suspended form. As regards organic matter in solution, that is an expression which is not clearly understood by most people. For the present purpose, however, it is sufficient to state that a large amount of the so called organic matter, which gives the color or vegetable stain to certain waters, is not truly in solution in the full chemical sense, but, as a matter of fact, is in the colloidal state. This colloidal state is an intermediate one between the true solution and the suspension state. The colloidal particles are in a very fine state of subdivision, and are truly in suspension and not in solution. Generally speaking, organic matter in true solution consumes more readily available chlorin or, a better term would be, potential oxygen, than colloidal or suspended organic matter, other things being equal.

Of the other forms of living organic matter in water, the bacteria are the most significant in this problem. Bacteria from the view point of readiness of oxidation may be divided into two classes. The first of these comprises the normal or vegetative organisms, and probably the majority of bacteria which are ordinarily present in waters belong to this class. It is in this form, the vegetative state, that the bacteria are most readily destroyed by oxidation and other forms of sterilization.

In the second class may be placed the "spore former." When in this condition, the small bacterial cell is surrounded by a thick membrane or sheath, much thicker and more impermeable than the sheath surrounding the ordinary or vegetative cell. The bacteria when in this state are very difficult to destroy by oxidation or other methods of sterilization.

The importance of this bacterial condition is, however, comparatively slight and almost negligible in this case because the specific germs of infectious diseases, such as typhoid fever, Asiatic cholera, etc., do not form spores, and the same is true of *B. coli* and the majority of bacteria which predominate the intestinal tract of man and domestic animals. Bacteria in the spore form are not entirely killed by calcium hypochlorite in the amounts usually added to water, but the objectional vegetative forms are very susceptible to hypochlorites, and are readily destroyed, as shown by the results of the experimental work tabulated in this paper.

EXPERIMENTAL.

The experimental work is grouped into four divisions: (1) Application of chlorid of lime, that is, determination of the amount of hypochlorite necessary to practically sterilize waters of different quality and varied composition. (2) Determination of the time of disappearance from the waters of the relatively small amounts of hypochlorite used. (3) Determination of the amount of hypochlorite necessary to impart a taste and odor of chlorin. (4) Determination of increased hardness, if any, imparted by small amounts of hypochlorite.

In order to make the study of the efficiency of chlorid of lime as comprehensive as desirable, and to determine the effect of organic and mineral matter on the efficiency of the process, several waters containing different amounts of organic matter and mineral constituents were selected for treatment with hypochlorite. Sewage from one source was also treated.

The waters were the Madison City water, Lake Mendota water, Lake Michigan water, Lake Winnebago water, and Madison sewage.

The first mentioned water is clear, colorless, very hard, and contains only a small amount of organic matter. The second, Lake Mendota water, is quite hard, contains a moderate amount of organic matter, and, although free from odor, possesses more or less turbidity; quite a little organic matter is in suspension as well as in true solution. Lake Michigan water is color-

less and usually free from turbidity (at points 1 to 7 miles from shore) where the samples were collected, only moderately hard, but usually contains a considerable quantity of organic matter. Lake Winnebago water is decidedly colored and slightly turbid, rather soft, but contains a great deal of vegetable organic matter, as the color indicates. The organic matter is mostly in the form of a colloid, intermediate between solution and suspension. It will be noticed that there is a gradual decrease in hardness in the waters selected, while there is a corresponding increase in organic matter. Sewage, of course, contains very much organic matter.

Before subjecting the water to bacteriological examination, a chemical analysis comprising determination of odor, color, turbidity, free ammonia, albuminoid ammonia, nitrites, nitrates, oxygen consumed, alkalinity, and total solids was made in order to determine the approximate amount of organic matter and the quantity of mineral material present. Later, samples of each water and of sewage were taken for the bacteriological work and treated with the different concentrations of hypochlorite shown in the tables; and after contact, usually of one-half hour, gelatin and agar plates were made and dextrose broth tubes inoculated. In order to study the effect of time, determinations were made, in certain cases, of the number of bacteria remaining at the end of ten minutes, one hour, and two hours, respectively; also the effect of temperature on the efficiency of the process was studied in a few instances.

The effect of different concentrations of hypochlorite on bacteria in the Madison City water is shown in Table I. A large number of tests were made with each water over a considerable period of time, but in order to conserve space only a few representative tables will be given in each case.

TABLE I.

DISINFECTION OF MADISON CITY WATER WITH CHLORID OF LIME.

8-29-12. Time of contact: 10 minutes.

	Av. Cl. in p.p.m.	Gel. ct.	Agar ct.	Gas production in dextrose.		
				0.1 c.cm.	1. c.cm.	10. c.cm.
Raw water.....	....	220	25	—	—	—
Treated water.....	0.1	15	5	—	—	—
	0.3	7	3	—	—	—
	0.5	1	1	—	—	—
	0.7	1	0	—	—	—
	1.0	0	1	—	—	—

The rapidity of the action of calcium hypochlorite as a disinfectant of waters relatively low in organic matter, is, as shown in the first table, marked and interesting, and indicates that long periods of contact are unnecessary.

In Table II are given some of the results of a series of experiments made for the purpose of determining the effect of temperature on the efficiency of hypochlorite sterilization of Lake Mendota water. Relatively high concentrations of the hypochlorite were used in these tests in order to get an idea of the approximate amount necessary to actually sterilize the water.

TABLE II.

DISINFECTION OF LAKE MENDOTA WATER WITH CHLORID OF LIME.

8-15-12. Time of treatment: $\frac{1}{2}$ hour. Temp. 21° C.

	Av. Cl. in p.p.m.	Gel. ct.	Agar ct.	Gas production in dextrose.		
				0.1 c.cm.	1. c.cm.	10. c.cm.
Raw water.....	....	8,750	160	+	+	+
Treated water.....	0.1	2,520	9	+	+	+
	0.3	4	5	—	—	+
	0.5	2	2	—	—	—
	0.7	3	5	—	—	—
	1.	1	1	—	—	—
	3.	0	2	—	—	—
	5.	1	1	—	—	—
	7.	2	2	—	—	—
	10.	0	1	—	—	—
	15.	0	1	—	—	—
	25.	0	1	—	—	—
	50.	0	0	—	—	—

The results obtained in this series of experiments indicate that, although the temperature was decidedly different in each case, the reduction in the number of bacteria was about the same; over 99 per cent. of those growing on gelatin, about 96 per cent. of those growing on agar, and most of the gas-forming organisms were destroyed after one-half hour contact, indicating that the efficiency of the process is independent of the temperature.

The large reduction effected with small amounts of the disinfectant is particularly interesting, but it will be noticed that after 99 per cent. of the organisms have been removed, a further small reduction in the number of the remaining bacteria necessitates relatively large quantities of the

hypochlorite; and that to obtain actual sterility, very high concentrations are required. The destruction of gas formers in this case, and in most cases, is higher than the reduction in the number of total organisms, and it is probably safe to assume that the removal of all vegetative pathogenic bacteria will be as nearly perfect as the removal noted in this group. The bacteria which resist the relatively high concentrations are mainly spore-forming organisms of the harmless variety.

A table showing the results of treatment of Lake Michigan water with chlorid of lime for various periods of time is given in Table III.

TABLE III.

DISINFECTION OF LAKE MICHIGAN WATER WITH CHLORID OF LIME.
10-2-12.

Time of treatment.	Gel. count.			Agar count.			Gas production in dextrose.					
	30 m.	1 h.	2 h.	30 m.	1 h.	2 h.	30 m.	1 h.	2 h.	30 m.	1 h.	2 h.
Raw water....	2,700	2,500	2,800	1,500	1,200	1,700	.1 1 10 - + +	.1 1 10 - + +	.1 1 10 - + +			
Treated water Av. Cl. in p.p.m.												
0.1	500	800	1,125	240	80	400	- - +	- - +	- - +	- - +	- - +	- - +
0.3	9	3	2	6	4	2	- - -	- - -	- - -	- - -	- - -	- - -
0.5	2	2	1	5	3	1	- - -	- - -	- - -	- - -	- - -	- - -
0.7	3	1	0	3	2	0	- - -	- - -	- - -	- - -	- - -	- - -
1.	0	3	1	2	1	0	- - -	- - -	- - -	- - -	- - -	- - -
3.	2	0	0	2	2	0	- - -	- - -	- - -	- - -	- - -	- - -
5.	1	1	0	1	1	1	- - -	- - -	- - -	- - -	- - -	- - -
7.	1	1	0	0	0	0	- - -	- - -	- - -	- - -	- - -	- - -
10.	0	0	0	0	1	0	- - -	- - -	- - -	- - -	- - -	- - -

The rapidity of the action of the hypochlorite is again manifested in these tables. It appears that long periods of contact are not required to effect a desirable reduction; the greater part of the disinfection is accomplished within the first ten or fifteen minutes, and the results indicate that one-half hour contact is ample to secure practical sterilization. It will be noticed that when an insufficient amount of hypochlorite, 0.1 p.p.m., is used, as indicated in Table III, a subsequent growth takes place. When, however, sufficient but relatively small quantities of hypochlorite, 0.3-0.5 p.p.m., are applied, a reduction of 95 per cent. of the total bacteria results; but to destroy the remaining 5 per cent. necessitates long periods of contact and high concentrations of chlorid of lime.

The results tabulated in Tables I, II, and III, indicate that the mineral content of a water has very little effect on the efficiency of the disinfectant, and that relatively small amounts are sufficient to give very satisfactory results with colorless waters containing moderate quantities of organic matter and low turbidity.

Tabulation of the results of treatment of a fairly highly colored water, from Lake Winnebago, Oshkosh, containing relatively a large amount of colloid organic matter is shown in Table IV.

TABLE IV.

DISINFECTION OF LAKE WINNEBAGO WATER WITH CHLORID OF LIME

8-15-12. Time of Contact: $\frac{1}{2}$ hour.

	Av. Cl. in p.p.m.	Gel. ct.	Agar ct.	Gas in dextrose broth.		
				0.1 c.cm.	1. c.cm.	10. c.cm.
Raw water.....	.....	2,250	480	+	+	+
Treated water.....	0.1	1,500	200	+	+	+
	0.3	1,000	110	—	+	+
	0.5	900	70	—	+	+
	0.7	750	40	—	—	+
	1.0	85	10	—	—	+
	3.	55	9	—	—	—
	5.	25	8	—	—	—
	7.	15	6	—	—	—
	10.	9	4	—	—	—

The above results are representative and similar to the results of many other examinations of this colored water. The fact is clearly shown in this set of tests that the chemical composition of a water, relative to organic matter, has an important influence on the germicidal value of hypochlorite.

Colored waters, such as this one is, containing a comparatively large amount of organic matter, principally in the colloidal form, require relatively much larger quantities of hypochlorite to effect a suitable reduction in the number of bacteria than is necessary to attain a similar reduction in the case of colorless waters, as is indicated by a comparison of the results given in Tables I to IV. A glance at Table IV will show that 1.0 p.p.m. of available chlorin was required to produce desirable results, and 3.0 parts to destroy all gas formers, while only 0.3 to 0.5 p.p.m. of available chlorin was necessary to effect satisfactory disinfection with the clear waters.

The hypochlorite applied is eventually completely consumed by chemical

reaction with the organic matter, and the germicidal action takes place in the interval of time between the addition of the hypochlorite and its final exhaustion by chemical reaction.

The results of several experiments carried on for the purpose of determining the effect of application of chlorid of lime on sewage, which may be regarded as a concentrated solution of organic matter possessing considerable turbidity, conclusively indicate that the amount of hypochlorite necessary for efficient treatment is dependent on the quantity of organic matter present. In general, it may be stated that the amount of organic matter present practically determines the amount of hypochlorite that it is necessary to use in a particular case, and that the normal mineral constituents have practically no effect on the efficiency of the process.

For the purpose of determining the approximate interval of time between the application of chlorid of lime to the various waters, and its complete disappearance by reaction with the organic matter, treated liter samples were tested for hypochlorite from time to time by the starch iodide method.

The plus sign (+) in the table shows that a positive reaction or blue color was obtained, indicating the presence of hypochlorite; the minus sign (−) indicates the absence of color, and shows the period of time after which no hypochlorite could be detected. The results of the tests with the clear artesian Madison City water, containing relatively a very small amount of organic matter, and Lake Mendota, containing a moderate quantity of organic material, are given in Table VI.

TABLE VI.

Av. Cl. in p.p.m.	City water.							Lake Mendota water.						
	1h.	2h.	6h.	8h.	12h.	24h.	48h.	1h.	2h.	6h.	8h.	12h.	24h.	48h.
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0.3	+	+	—	—	—	—	—	—	—	—	—	—	—	—
0.5	+	+	+	+	—	—	—	+	+	—	—	—	—	—
0.7	+	+	+	+	+	+	—	+	+	—	—	—	—	—
1.0	+	+	+	+	+	+	+	+	+	+	—	—	—	—
3.0	+	+	+	+	+	+	+	+	+	+	+	+	+	—
5.0	+	+	+	+	+	+	+	+	+	+	+	+	+	+

It appears from the above results that the smaller amounts of hypochlorite disappeared from the lake water containing a moderate quantity of organic material within 6 to 8 hours, but similar amounts did not disappear so quickly from the clear artesian city water. The conclusions which

may be drawn from these tests, and similar ones not tabulated, have general applicability and indicate that the small amounts of chlorid of lime—0.1 to 1.0 part per million—which are usually required to effect satisfactory disinfection of fairly clear waters entirely disappear within a few hours after application.

It is frequently claimed that a treated water possesses a taste and odor

TABLE VII.-1.

TREATED CITY WATER.

Containing a Small Amount of Organic Matter.

Av. Cl. in p. p.m.	Taste.						Odor.					
	1 h.	2 h.	6 h.	12 h.	24 h.	48 h.	1 h.	2 h.	6 h.	12 h.	24 h.	48 h.
0.1	—	—	—	—	—	—	—	—	—	—	—	—
0.3	—	—	—	—	—	—	—	—	—	—	—	—
0.5	+	—	—	—	—	—	+	—	—	—	—	—
0.7	+	+	—	—	—	—	+	+	—	—	—	—
1.0	+	+	+	—	—	—	+	+	+	+	+	—
3.0	+	+	+	+	+	—	+	+	+	+	+	+
5.0	+	+	+	+	+	+	+	+	+	+	+	+

TABLE VII.-2.

TREATED LAKE MENDOTA WATER.

Containing a Moderate Amount of Organic Matter.

Av. Cl. in p. p.m.	Taste.						Odor.					
	1 h.	2 h.	6 h.	12 h.	24 h.	48 h.	1 h.	2 h.	6 h.	12 h.	24 h.	48 h.
0.1	—	—	—	—	—	—	—	—	—	—	—	—
0.3	—	—	—	—	—	—	—	—	—	—	—	—
0.5	—	—	—	—	—	—	—	—	—	—	—	—
0.7	—	—	—	—	—	—	—	—	—	—	—	—
1.0	sl.	—	—	—	—	—	sl.	—	—	—	—	—
3.0	+	+	+	—	—	—	+	+	+	+	—	—
0.5	+	+	+	+	+	—	+	+	+	+	+	—

of chlorin, consequently it was thought desirable to make several tests in order to determine whether perceptible taste and odor of chlorin were imparted to the water by the small amounts of hypochlorite generally used to disinfect. For this purpose, liter samples of the different waters were treated with various amounts of chlorid of lime, and several persons were asked to take the odor of and to taste the treated samples at different

periods after treatment. They did not know which contained chlorin, or the amount present. The results are shown in the tables below. The (+) sign indicates that odor and taste of chlorin were perceptible. The (-) sign indicates absence of odor and taste of chlorin.

In the case of treated Lake Michigan water results similar to those of treated Lake Mendota water were obtained, while odor and taste of chlorin were entirely absent from the samples of colored Lake Winnebago water, containing less than three parts per million of available chlorin, a few hours after treatment.

It is interesting to note that the treated samples of Lake Mendota water containing less than one part per million of available chlorin did not possess perceptible taste and odor of chlorin one hour after treatment; and that the taste and odor of chlorin imparted to the treated city water, containing much less organic matter than the lake water, did not disappear so rapidly.

The results of the entire series of experiments along this line indicate rather conclusively that the small quantities of chlorid of lime which are sufficient to practically sterilize waters of fair quality do not impart a lasting taste and odor of chlorin. The imparted taste and odor of chlorin, which is only very slight at any rate in waters containing concentrations of hypochlorite varying from 0.1 part to 1.0 part per million of available chlorin, usually disappears in a few minutes and generally in less than an hour.

A treated water should not only meet all the sanitary requirements of a suitable supply, but it is essential that such a water should be satisfactory from an industrial standpoint as well; in this case the hardness of a water should not be materially increased by treatment with small amounts of chlorid of lime if the process is to be entirely suitable from an industrial viewpoint.

In order to determine whether a material increase in the hardness resulted from the addition of hypochlorite, the hardness of the various waters was first determined by the Clark's soap method, then liter samples of these same waters containing concentrations of available chlorin varying from 0.1 to 5.0 parts per million were prepared, and the hardness of each sample was determined one-half hour after the hypochlorite had been added. In no case was an appreciable increase, as determined by the soap method, detected. These results, therefore, indicate that a water supply may be beneficially treated with small amounts of chlorid of lime without any detrimental effect on the quality of the water for industrial purposes.

It is sometimes claimed that the hypochlorite process is more or less unsatisfactory because of the "after growth" of bacteria; but it does not appear to be quite reasonable to base a condemnatory judgment of this method on such grounds. Secondary or subsequent growths, provided sufficient hypochlorite is used to practically sterilize, have really no sani-

tary significance, and the efficiency of the disinfection from the standpoint of pathogenicity of the water is measured by the maximum reduction, independent of any subsequent increase. It has been shown in the tables that the intestinal bacteria of the vegetative types are particularly susceptible to small amounts of hypochlorite. Pathogenic bacteria are also very sensitive to small quantities of chlorid of lime. The results of a number of experiments made for the purpose of determining the effect of different amounts of hypochlorite on typhoid organisms clearly show that the efficiency of the process is very high, and indicate that pathogenic and intestinal bacteria of the vegetative type are rapidly destroyed by hypochlorite, consequently the remaining bacteria in a treated water which multiply and form the "after growth" are harmless resistant vegetative organisms, or spore formers. The phenomenon of the "resistant" minority is common to all kinds of sterilization, whether it be by heat, cold, chemicals, or other means. Therefore, the practical procedure is to determine the amount of hypochlorite necessary for practical sterilization rather than to attempt the ideal complete sterilization.

In the previously mentioned tests, liter samples of Madison City water were sterilized with steam under pressure, and inoculated with typhoid organisms when cold. The water was seeded quite heavily in order to make the tests as rigorous as desirable. The results indicate that less than 0.5 part per million of available chlorin was sufficient to completely destroy all typhoid bacilli.

For the purposes of ascertaining the nature and extent of the secondary growth which occurs in treated waters during storage, a quantity of Madison City water was inoculated with fecal material and liter samples treated with different concentrations of calcium hypochlorite and subjected to bacteriological examination every twenty-four hours for six days. The water was moderately seeded and represented a rather highly polluted water, containing (by count) approximately 300 *B. coli* and streptococci per c. cm. and showing gas formation in 0.001 c.cm. in dextrose broth. Treatment with 0.5 part per million of available chlorin for one hour was sufficient to practically sterilize the water, completely destroying all *B. coli*, streptococci, and gas-forming organisms. The only case of after growth occurred in the sample containing the smallest amount of hypochlorite, but the subsequent multiplication proved to be due, mainly, to the growth of harmless spore-forming organisms; *B. coli*, streptococci, and gas-forming organisms were entirely absent. These results, and the results of many similar tests, conclusively indicate that there is no after growth of objectional intestinal organisms, and consequently the efficiency of the process of sterilization with hypochlorite, depending only on the destruction of pathogenic and other objectional bacteria and judged by the total removal of organisms, is entirely independent of any subsequent or "after growth."

SUMMARY AND CONCLUSIONS.

Chemical disinfection offers a means whereby a very satisfactory purification of a water may be accomplished. Comparisons on a cost basis of the methods of chemical disinfection mentioned make it apparent that calcium hypochlorite is the most satisfactory and efficient agent at the present time for water disinfection.

The amount of organic matter in the water practically determines the quantity of calcium hypochlorite that it is necessary to use. As a general rule, practical sterilization may be accomplished by the application of from 0.1 to 1 part per million of available chlorin, but occasionally concentrations of 2 and 3 parts per million of available chlorin are necessary to effect desirable results with rather highly colored and turbid waters.

The removal of *B. coli* and intestinal organisms is usually more complete than that of the total organisms. Under the conditions of the laboratory experiments, the results of hypochlorite disinfection on typhoid organisms and intestinal bacteria in the various waters were practically identical. It is, therefore, safe to assume that the viability of pathogenic bacteria under working conditions in practical water disinfection is no greater than that of the typhoid organism, or intestinal bacteria as a whole. Consequently, the disinfection effected by calcium hypochlorite relative to the total bacterial removal may be referred directly to pathogenic bacteria with assurance of reasonable accuracy.

The slight odor and taste of chlorin imparted when somewhat more than 0.5 part per million is applied disappears in a short time, leaving the water entirely acceptable from a sanitary standpoint; and, as the hardness is not materially increased by the application of the usual small quantities employed, the treated water is not rendered unsuitable for industrial purposes.

There is no apparent reason for believing that the results are not of general applicability. The reactions involved are particularly free from interference on the part of the mineral constituents of normal waters; and normal variations of temperature have practically no effect on the final results. The efficiency of the process is also entirely independent of the secondary or after growth of harmless resistant organisms.

The calcium hypochlorite process of sterilizing water combines the desirable qualities of economy and efficiency, and affords cities and towns, which are unable financially to build a filtration plant, but are forced for sanitary reasons to adopt some method of purification, a means of ensuring a safe water supply. It may be used to advantage in cases of emergency, where either filtered or unfiltered supplies have become infected and where it is difficult to cease using such supplies. Where mechanical filtration is not sufficient to render a water safe, treatment with calcium hypochlorite offers an excellent method of sterilization and is especially applicable in such cases.

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SHOULD RURAL SCHOOLS BE CLOSED?

In so vast a country as this, composed of units with mixed populations in different surroundings and with varied interests, it is manifestly impossible to demand uniform laws and regulations. "States' Rights" has therefore since the beginning been recognized as a principle which must permit local care of purely local affairs. In health matters, there are some items of universal necessity, and more and more there has been the demand that uniform methods in vital statistics be established. The need of some such items, important everywhere, has focused attention on uniformity; and may not the tendency now be towards trying to establish methods suitable to one locality yet unfit in another? An important question of

the kind would appear to be whether schools should be closed during outbreaks of communicable disease.

In his able paper on the subject, Dr. F. G. Curtis has argued that the public schools, under good systems of medical inspection, form one of the most efficient organizations for prevention. Reasonably well guarded at all times and with closest scrutiny when danger is suspected, the school children are under excellent supervision. The value of this scrutiny may depend upon some factors outside health work, such as whether it is the health department or the school committee that looks after the condition of the scholars, but if there are deficiencies here they are of administration and not of principle.

School keeps the young people under supervision and in hygienic environment for a number of hours a day. There is reason to believe that but little infection is distributed and that it takes the lines of less resistance, the street play and home hours. Closing city schools turns the children practically into the street for all the time and in reality increases the chance of infection. But this is in the well-guarded city; to what extent is the policy a proper one for rural schools?

It stands to reason that the health officials of the village are not so well fitted for the kind of action that an outbreak of infection demands. Too often the health work is the part-time duty of the health officer, who must have his private practice or starve, for the scanty salary will not support him. Any outbreak therefore appeals to him first as a physician. It calls upon his time, and takes his professional attention and just when there is most need of him as health officer he is in greatest demand as a doctor. Half a dozen Massachusetts towns have recently demonstrated the truth of this and the State has come in to define and work out the situation. Under circumstances like these may not the closing of the schools be the proper course?

In the country the children come to school from widely separated homes. They live in little scattered groups whose members should be quite free from risk from the outside. The school brings them together. At their homes they do not gather in great groups on the streets. The situation is radically different from the city, and it would seem that the greater contact is in the school.

The rural school would be of less consequence as a focus, were a system of adequate inspection possible. But here again is a weak spot in rural health administration; good school inspection is costly and in the country it is difficult to maintain of standard quality.

Under these circumstances and till the efficiency of rural health work can be maintained at a high standard, may it not be well to recognize a differing environment and allow that schools and churches, even, in Massachusetts may be closed in times of serious outbreaks as a measure for the protection of the people?

VITAL STATISTICS AND THEIR NEGLECT.

Since the issue of the last JOURNAL, the office of vital statistician to the Boston Health Department has been abolished and re-established. The municipality has to congratulate itself on the quickness with which the authorities rectified what would have been a grievous error. But the incident is valuable in pointing out how slowly the importance of vital statistics is coming into recognition.

Despite the fact that public health work has advanced wonderfully, it remains true that the foundation of all progressive health work, the figures of population, morbidity and mortality are almost everywhere deficient. There is hardly an investigation that one can make that does not meet with this difficulty. Lack of standardization, lack of definite figures and lack of public interest contribute, each of them, to the unfortunate situation.

Those movements in the interest of health that are spectacular, those which lend themselves to a breezy story of progress, or those which lie in obvious benefits to business, find enormous support and are rushed to perfection, often to the detriment of more important health factors. But neglect of the fundamental principles is the way of the world. The hero who jumps into the water to rescue some unfortunate is awarded a Carnegie medal, but if he should seize the unfortunate before he falls from the wharf, his more meritorious action of prevention would attract no notice.

Prevention is and always will be an up-hill struggle, because it lacks dramatic action. People would rather swat flies than clean the garbage pail. The public prefers the spectacular fire-fighting with all that it means in loss, to quiet life in fireproof towns. So prevention must be founded on an improved education of the people. Prevention must furthermore depend upon figures, for it cannot be carried on without knowing what there is to prevent and how much. Vital statistics tell what the health failings of the community are, what rocks there may be in the channel. There is no other way in which this may be learned. The better the statistics, the more certain will be the value of preventive measures.

It is true that much of sickness is in outbreaks, and that in outbreaks the injury may be done before the symptoms are noted. But here exact figures are of greatest consequence. They serve to locate danger zones, they may mark waves of incidence and give time for preparation if not for valid prevention.

The crying need today in health administration is for a better appreciation of the place of vital statistics, education on the part of the people and closer attention on the part of the physicians, who are videttes in the health army, catching their individual portions of the fight and transmitting these to headquarters where they may be collated and the plans for defense determined. The health administration of a community cannot long be maintained much above the point where public education will support it, and the physicians, coming into contact with the families of the sick as they do, must be the strong force needed for the advance in public education.

MODERN METHODS OF FIGHTING THE HOUSE-FLY

ERNEST C. LEVY, M. D.,
Chief Health Officer, Richmond, Va.

Read before the General Sessions, American Public Health Association, Colorado Springs, September, 1913.

You have all heard of the temperance lecturer who was to give a talk on the Demon Rum in a country town. The morning paper next day stated that, while the lecture was not given, it was nevertheless apparent to everyone in the audience that the speaker was full of his subject. This lecturer has nothing on me; for in the present instance not only the speaker but also all who are here present are simply covered with my subject. So I am assured of your interest from the start.

Extermination of the house-fly is one of our really important health measures. It is not necessary to go into proof of this today. Every health officer who has studied this question actively in the field, and not just written about it in his office or dabbled a little with it in the laboratory, is convinced that the house-fly is a very active agent in the dissemination of disease. I am going to assume that we all understand this. Moreover, it is surely fair to assume that, in many a case of illness not itself caused by flies, the delicately poised balance between life and death may well be turned by the annoyance and loss of rest brought about by this pestiferous insect. Still again, there is abundant reason why everyone of us in attendance on this meeting would like to see *Musca domestica*, and all allied species and genera, wiped off the face of the earth, or at least from that wonderful and otherwise perfect corner of it on which we are now assembled.

I think that up to even a year ago most of us felt that we were engaged in a hopeless kind of fight. We felt that we could of course do a great deal, but that in spite of killing millions of flies and doing our utmost to limit the breeding of this insect, yet their tremendous prolificness—the mere brute force of their numbers—would still get the better of our ingenuity.

This is not true today. The fight against the fly is a winning fight. We now have the necessary knowledge and the necessary machinery. To make these effective, however, we need the same old thing that we need in all public health work—the coöperation of the people. This, in turn, must be preceded by education of the people.

The evolution of our work for the extermination of the fly has been somewhat slow—slow at least for these days. But we have today methods

which are perfectly capable of wiping out the fly in any community within a very short time, provided always that the people understand and are ready to help us. More than this, if coöperation of all the people cannot be secured, we know how to eliminate the fly almost completely in any limited section of a city in which the local residents are sufficiently interested to carry on that part of the work which is assigned to them.

In order to fight flies successfully, we must fight them at every stage of their development. This means the keeping apart of flies and all material (especially horse manure) suitable for the depositing of their eggs; the removal, or destruction, of fly-blown material before the eggs have had time to develop into flies or into mature maggots, and the destruction of adult flies by all known means.

It is useless to expect results of a satisfactory nature if any single thing is neglected. Fly-swatting campaigns, for example, kill relatively few flies, even though the actual number killed may go into the millions. Nevertheless, fly-swatting has a decided field of usefulness, in that by this means we get rid of flies which are not reached by other methods, and which will multiply many hundredfold unless destroyed. To claim that fly-swatting is useless because only a few million flies are killed, or that it is worse than useless because these flies should never have been allowed to hatch, is altogether wrong. The life cycle of the fly is so short, from egg to egg, from maggot to maggot, from pupa to pupa, or from fly to fly, that each point precedes every other point as well as follows it. Those who contend that killing adult flies is the wrong way to proceed, because we should have prevented these flies from ever hatching out, fail to realize that the killing of a few adult flies of a previous generation would have gone really further back than merely preventing these flies from depositing their eggs in a favorable place.

The literal swatting of flies does not, of course, get rid of any very great number of these nuisances, but in all fly-swatting campaigns dead flies are counted regardless of how they were obtained, and hence the term "fly-swatting" is frequently used as essentially synonymous with the killing of adult flies by any method whatever.

For killing large numbers of adult flies no method is so productive of results as the use of traps. By this I do not mean the small fly traps sold for about 15 cents at hardware stores, and used about the house. Such traps are not found by the flies for a long time, and even then the number which such traps get rid of is relatively small. There are today in use traps of another kind—large affairs about two feet tall and fifteen inches in diameter. These traps are of very stout construction. They are built on the same principle as the smaller traps, but the cone ends in an opening which will admit one's thumb. The flies which once get through this opening and into the trap proper never find their way out again.

These traps are, therefore, not only useful on account of the tremendous number of flies which they catch, but, speaking from my personal experience, they are encouraging. When one sees flies by the thousand walking and flying about over every fraction of a square inch in such a trap without ever finding the large opening by which they entered, and out of which they could get with equal ease, one cannot fail to feel that it would be a disgrace to admit that an insect with so little sense could outwit man.

These large modern fly traps are not placed indoors, but in the case of residences they are placed in the back yard, and in the case of stores they are placed in the street near the curbstone. The manufacturers of this trap lay great stress on the rôle played by the bait which accompanies each trap. One or two drops of this bait are placed in a saucer of vinegar and put under the trap. The manufacturers claim that the bait so prepared will attract flies from a great distance, even from a kitchen in which a meal is cooking.

My own trap was built by myself at a cost of about 50 cents, and I did not find it necessary to employ any especially manufactured bait. A saucer of vinegar with a liberal sprinkling of sugar around it was in every way successful. Stale beer worked equally well. This trap caught many things besides house-flies. In fact, there was, roughly speaking, about one fly of some other kind to every two or three house-flies. These other flies were green ones and blue ones and gray ones, large and small, but the house-fly was always in evidence, outnumbering all other kinds put together. In addition to flies, my own trap caught regularly large numbers of June bugs, and at one period tremendous numbers of moths about the size of the last joint of one's thumb. Bees and wasps were also caught in considerable numbers. During the summer this one trap caught over three quarters of a million flies, calculated on a basis of 13,000 to a quart.

It can hardly be confended that even one such trap on a city block has no effect on the number of flies prevalent in that block, even though nothing else be done. In my own case, a neighbor living about ten doors from me was hatching flies throughout the summer at a far greater rate than I could catch them. Even under such circumstances, the number of flies on my block must have been lessened not merely by the 750,000 which I actually caught, but by numbers far greater than this, since the flies trapped early in the season would probably have multiplied at least a thousandfold before the end of the season.

After we get complete control over all breeding places, this special kind of trap will probably no longer play a prominent rôle, since it is not effective in dealing with the smaller residual numbers with which we will then have to deal. For this latter purpose smaller traps, tanglefoot paper, poisons and swatting will meet the situation.

These large fly traps have another distinct field of usefulness, as illus-

trated by the following case: A mile or so outside of Richmond there is a very attractive suburban community. From all that I have ever been able to see, there are few, if any, horses kept in this community, and all the lots are apparently free from any large collections of material which would serve as breeding places for flies. But regularly each year this community is literally overrun with flies. It is no exaggeration to state that I have seen at least one tenth of the surface on railings and pillars of porches occupied by flies. Where they come from I have never been able to determine. It is true that I have never made a thorough investigation, but there is no section of Richmond where I have ever seen flies as prevalent as they are in this suburb. Of course, these flies breed somewhere, either within or without the boundaries of this suburb, and an investigation would ultimately determine where. Pending this, however, it would be entirely practicable for this community to reduce the number of flies to a small percentage of their present numbers if each householder would use even one of these traps and look after it properly.

It seems to me that there is room for good work in determining what is the best bait to be used in traps of this kind. It would be desirable to find a bait which would attract flies but not moths, June bugs, wasps, bees, etc., since these insects consume the sugar far more rapidly than do flies, and thus necessitate more frequent rebaiting, besides which there are obvious personal objections to dealing with a trap in which the two insects last mentioned are present.

I shall not discuss at length the very important questions of stable construction and removal of manure. It is useless to expect very good results unless these things are properly looked out for. I am inclined to believe that the statement that 90 per cent. of all house-flies in cities breed in horse manure is far below the mark, and that very small numbers breed in any other material. Even though this be so, we must nevertheless believe that in a community in which there are no horses, or in which all horse manure is so perfectly handled that it never becomes accessible to flies, house-flies would deposit their eggs in other organic matter, if such were available. In fact, I frequently found during last summer large numbers of fly eggs laid on the bare wire of my large fly trap. Whether these were the eggs of the house-fly or of one of the other 57 varieties I am unable to state, but it would appear from this as if the female fly is unable to retain mature eggs beyond a certain point, but must deposit them somewhere.

Stable floors should by all means be of tight construction. I have frequently seen maggots disappearing in cracks less than one eighth of an inch wide between wooden blocks in a stall. Whether or not such maggots pupate, and whether or not they could ever emerge as adult flies, is another question which I have not had time to look into.

Recent experiments conducted by the Richmond Health Department have caused me to hold views quite different from those generally accepted in regard to stable construction and removal of manure. These experiments have been told briefly in a paper published a few months ago.¹ They convinced me that the house-fly does not normally enter the pupa stage in manure if the adult maggots find it easy to leave the manure and enter the earth. Since the paper above mentioned was written, additional experiments have been conducted by us. I will relate one of these briefly. Two wooden soap boxes, about two feet long and one and a half feet wide and nine inches deep were used in this experiment. In one of these boxes was placed fresh horse manure. This was supported on wire gauze with a mesh of about one half an inch, the bottom of this box having been first knocked off. This box was placed on top of a second one of exactly the same kind. This lower box was first filled with dry earth. The two boxes thus arranged were placed near a stable. At the end of 24 hours the manure in the upper box was loaded with eggs of the house-fly. Fine wire gauze was then nailed over the top of the upper box. The manure, meanwhile, had settled down so as to leave a space of about one inch between the upper surface of the manure and the fine wire gauze. Maggots developed promptly, but three days after the beginning of the experiment all the maggots had apparently left the manure box. Examination of the lower box at this time showed it to be swarming with large maggots. We then separated the two boxes and screened the lower one, which, to repeat, contained finely divided earth. We got thousands of flies from the box of earth, but not one from the box of manure, nor did careful examination of this manure show a single maggot or pupa. In other words, every maggot had left the manure and gone into the earth.

Our experiment went even further than this. The wooden bottom of the lower box (the one containing the earth had in it several small holes and cracks which we had failed to notice. Not only did all the maggots go through the nine inches of manure in order to get to the earth in the lower box, but a very considerable number of them continued on down through the nine inches of earth in the lower box, and then got out of this box through the holes and cracks above mentioned, as was shown by the fact that we found in the earth immediately under this box, and for several feet around it, maggots and pupæ. This experiment surely sustains our point—namely, that the house-fly does not normally pupate in manure but in earth.

The facts just discussed have an exceedingly important practical bearing in connection with fly-fighting work. It has heretofore been held that if all manure is removed from a city at intervals shorter than the minimum time in which the eggs of the house-fly can develop into adult

¹Am. Jour. Public Health, Vol. 3, No. 7.

flies, flies will not hatch from this manure while it is in the city. According to Howard, the minimum time from egg to fly is eight days, so that heretofore weekly removals of manure have been considered sufficient. It is obvious, however, that if manure stands on the ground, or is placed in receptacles which have in them even very small openings, fly breeding will take place freely, even though the manure is removed at intervals of four days, since three days have been shown to be ample for the development of eggs into maggots of such stage that they leave the manure and enter the earth, if there is any means available for them to do so. We believe, indeed, that large numbers will leave the manure in two days and successfully go through the remaining stages of development in the earth. We must, then, do one of four things: (1) remove all manure from the city every day, (2) store it in absolutely tight receptacles, (3) provide the means whereby maggots which leave the manure box through cracks or holes will fall into some tight receptacle in their efforts to reach the earth, or (4) store the manure in a receptacle especially designed to encourage the maggots to leave the manure and catch them as they do so.

One of our great needs in fighting the house-fly is some substance which will effectively kill eggs, maggots and pupæ of the house-fly. While many substances have been recommended for this purpose, I have not yet found any which was really efficient. Such a substance must be cheap, it must penetrate the manure to a considerable depth, it should not be poisonous to human beings, or especially offensive to them, and it should not interfere with the fertilizing value of the manure, while at the same time it must kill eggs, larvæ and pupæ. The discovery of such a substance would be of tremendous value.

Even though we know of no substance which will fulfill all the indications just mentioned, the use of a fly repellent has considerable value. In any community in which flies are prevalent, we may assume that horse manure becomes fly-blown in stables within a very short time after it is dropped. Frequent spraying of the droppings with some coal tar product will accomplish a good deal in the way of limiting the number of eggs which are deposited in manure in the stable between periods of removal to a proper receptacle. The screening of horse stables is also desirable from this standpoint. Windows offer little difficulty, but screening the doors of large livery stables is scarcely practicable.

Horse droppings on the streets are of no importance in fly breeding. There are many reasons for this, but most of them are self-evident, and hence will not be entered into.

In any campaign against the house-fly it is of the utmost importance that food supplies should be made inaccessible to as great an extent as possible. This constitutes one good reason for having covered garbage pails, even if garbage is not a suitable place for the breeding of the house-

fly. In spite of all that can be done, it is scarcely likely that any fly will actually perish for lack of food in any of our cities, hence the chief reason for limiting the amount of food to which they have ready access is that this measure will increase the efficiency of our fly traps.

In spite of the length of this paper, there are a number of minor points which I have of necessity failed to touch on. These are for the most part points which are so generally understood that this paper loses nothing by omitting them.

In closing I wish to repeat what I said in opening—that our methods of fighting the house-fly are today sufficiently well developed to enable us to accomplish the extermination of flies in any community in which these measures are diligently applied, and even to exterminate them in limited sections of a community provided the entire community cannot be sufficiently interested to attack the problem.

DISCUSSION.

DR. C. E. TERRY: I heartily agree, for the most part, with everything that Doctor Levy has said. I think, as he has stated, that we have been neglecting the soil around manure piles and manure bins very needlessly and with very bad results in lessening the amount of fly-breeding in these places. We found at Jacksonville that in dirt floor stables the flies' larvæ would leave the manure shortly after hatching from the egg and go into the floor of the stable and would there pupate. The manure was scraped up or swept up and the maggots that were an inch and a half or two inches deep in the soil, getting all the nutriment they require from the dirt in which they were living, went on and pupated and hatched the flies, and the daily cleaning of those stables in no wise interfered with the fly-breeding which was caused by the dirt floors. Doctor Levy wrote me about this fly-trap and we tried it. We manufactured one according to his directions, took a barrel, bored 35 or 40 holes in the bottom, and put it up on a tub of water. We screened the top and left about a 6-inch chamber in the top to see if by any chance any of these larvæ were going to pupate in the manure, in spite of the fact that Doctor Levy stated they undoubtedly preferred the sand for that purpose. We, in our first experiment, filled the manure barrel in about four days, filling it as it would be filled in use by the stable owner. I did not succeed in counting the larvæ or the flies in that experiment, for the reason that the larvæ decomposed. I had not thought to put any preservative in the tub and the ants got hold of the flies, but we had a large crop of flies, as far as we could tell, a great many more flies at the top than larvæ below. In the second experiment we put a preservative in the water below to keep the maggots from decomposing and arranged a small fly-trap on top of our screen at the top of the barrel, so that we could receive the flies without difficulty

and keep them away from the ants, and that experiment gave us 11,880 maggots and 3,778 flies. In other words, the receptacle, as we worked it, and we used it exactly as described by Doctor Levy, was about 75 per cent. efficient. It occurred to me, in that connection, however, that flies will not naturally burrow; their natural inclination is to go up. In the paper that I read in Havana two years ago I reported raising flies through 48 inches of sand, buried as larvæ or as eggs, and recovering from them organisms like larvæ, and the inclination of the fly, I still believe, is to go up,—I mean the inclination of the maggot is to go up. I believe, however, that if the depth of this manure receptacle is shallow, 6 or 8 inches, that in the first layer of the manure placed in that receptacle you will get nearly 100 per cent. of larvæ through the bottom; and in the second 6 or 8 inches, I believe you will get considerably less, and in the later portions added to that manure barrel I think you will get comparatively few of the larvæ out through the bottom. In the third experiment made we acted on that principle and placed in the bottom of our receptacle old manure, comparatively free from larvæ or eggs. In the upper part, or third, of the barrel, we placed manure which contained a great many larvæ and eggs. The figures of that experiment reversed the figures from the first. We secured from that third barrel 680 larvæ and 1,380 flies, and I believe that the apparatus will probably range from 30 per cent. to 75 per cent. efficient, judging from our own results. We have not run enough of them to state definitely yet to that effect. However, the matter is one that should be thoroughly investigated and it may be possible to put it to good use in fighting the fly. I believe, though, it is a rather cumbersome proposition for the average stable owner. I cannot imagine our negro hack drivers caring for a receptacle of that kind, keeping water in the bottom to kill the larvæ. If they do they have got to keep it so it won't crack, which means a galvanized receptacle, and I doubt very much if this new weapon is going to give the results that Doctor Levy promises. However, I hope he may be right. I have made a short review of the situation as it appears to me, which I will read, with your indulgence.

In the newer sanitation
There is nothing in creation
That arouses consternation
Quite as easily as the fly.
He is found in every city,
In each health department ditty
And, as maggot, more's the pity,
He will get us when we die.

You will find him in the stable,
Round the privy, on your table,
Or wherever he is able
To get a bite to eat;

In the hut and home palatial,
From the torrid to the glacial,
Nor does suiciding racial
Offer hope of his defeat.

We have tried all kinds of trapping,
But have never caught him napping,
And our hopes were slowly sapping
When from a barrel crack'd
Levy saw the larvæ flowing
To the ground, a fly crop sowing,
And an idea started growing
From this biologic fact.

In his eye there came a gleaming
As he saw those maggots streaming;
All his life he had been dreaming
Of his chance and it was here!
So he searched through the manure,
From the bottom up were fewer
Of the maggots,—oh the lure
Of the earth was very clear.

Then and there was born invention
Of a barrel, for detention
Of manure, with the intention
To let the maggots through,
And below in poisoned water,
Would they beg in vain for quarter
While Levy watched the slaughter
In a way entirely new.

While the bottom he was watching
From the top were pupæ hatching,
That Levy was not catching,
But he's got the beggars scared,
We may learn at some time later,
Of new biologic data
From the maggot-trap creator
That at present we are spared.

DR. E. C. LEVY:

There is really very little for me to add in closing this discussion, except to reply to the objections raised by Doctor Terry. I am really surprised that he should undertake to question the principle on which the maggot trap has been evolved, when by his own admission he has undertaken but three experiments, the first of which was defective, and the last of which he did not himself complete. Even in these experiments he found that a large number of maggots left the manure, although, if subsequent experiments confirm his results, the number of flies which hatched from maggots

which remained in the manure was too large to make the maggot trap as valuable as I believe it to be.

As stated in my paper, we have conducted many experiments in Richmond—quite a number since Mr. Tuck and I wrote our paper on the maggot trap. In only one instance did we get over 100 flies from the top of the barrel, while in every case we got many thousand maggots from the bottom. In our first three experiments we relied on examination of the manure for any maggots, pupæ, or pupæ cases, but failed to find any in a single instance. Undoubtedly, screening the top of the barrel, as suggested by Doctor Terry, is a far better method, and is the one which we have followed in our subsequent experiments. We have tried to make this top screen somewhat dome-shaped, and have placed a small fly trap over a hole which we have made at the highest point of the dome. This makes it far easier to count the flies.

In order to judge of the possible error in the first three experiments, we tried the two methods. In the case in which we got 650 flies from the top of the barrel, the manure was searched at the end of two weeks, and we found about 600 pupæ and pupæ cases. In the case in which we got 55 flies from top trap, 15 pupæ cases were found without difficulty in the upper part of the manure. On another occasion I added 20 pupæ to a large shovelful of manure which was otherwise free of them. Without any difficulty whatsoever 15 of these were recovered, and a more diligent search brought to light 3 more, or 90 per cent. of the small number which was present. These last mentioned facts indicate beyond doubt that if any considerable number of maggots had remained in the manure in our earliest experiments, the very careful search which we made for them could not have failed to reveal a considerable number of pupæ or pupæ cases, while, as a matter of fact, not a single one was found in any instance.

It is entirely conceivable that the maggot trap may not be equally applicable in all sections of the country. There are many hypotheses which might explain such differences, if such differences are found actually to exist. For example, in a section in which a sandy soil prevails, the delicate skin of the maggot may be harmed by penetrating such soil. If this be true, the maggots in such section would do better to risk the vicissitudes of remaining in the manure, and they would have received such an impress through many generations that they would not leave the manure even though, in a special instance, there was placed under it soil which was not injurious to them. In other words, maggots in such a section would have lost, or failed to acquire, the habit of leaving the manure, even though given abundant opportunity to do so. I can only say that all our experiments in Richmond have shown that with us the soil is the natural place for pupation of the house-fly, and that unless this be recognized we will fail to eliminate flies.

Many more experiments must be conducted before we will know a number of points of considerable interest in this connection, but I wish to bring before the Association the above facts, in order that all of us may take advantage of them from now on.

I wish to add just a word in connection with the maggot trap. - In our Richmond work I have never seen any maggots in the actual act of leaving the manure barrel and dropping into the receptacle under it, although, at one time or another, I have watched perhaps a full hour to see them do so. Although we caught thousands of maggots a day, we always found the entire "catch" of each day when we first went to the trap in the morning. These maggots we then removed, in a number of our experiments, and each evening the receptacle was found to be either empty or else to contain only a few straggling maggots. Next morning, however, thousands of maggots were found, and this continued up to the time that the manure had become free of them. Apparently the maggots, under the conditions of our typical maggot trap and when this trap is out of doors, leave the manure only at night. This suggests a number of points, some of which we have already followed up but none of which I can discuss in the limited time at my disposal. However, in one of the three original observations which first suggested to us the principle of the maggot trap, a steady stream of maggots was leaving the manure, hour after hour, during the daylight hours. Conditions in this case were quite different from those in our typical maggot trap.

While I have undertaken to reply to Doctor Terry's scientific objections, I realize that I have not yet replied to him adequately. He took a somewhat unfair advantage of me when he sprung his most excellent poetical criticism. I enjoyed this as much as the rest of you. Doctor Terry favored me with a copy of his verses on yesterday, so my time for a reply to these has been short. However, in closing let me say:

My dear Doctor Terry, 'tis interesting, very,
To know that your maggots decline
To leave the manure, and find death that's sure,
In your trap as they do in mine.

'Tis truly distressing, and you had me guessing,
Until the real reason I found—
To Virginia's soil even maggots will toil,
But prefer dung to Florida ground!

A NEW SHIPPING OUTFIT FOR ICED WATER SAMPLES.

FREDERICK H. BILLINGS and C. C. YOUNG.

Read before the Laboratory Section, American Public Health Association Colorado Springs, September 9-13, 1913.

The portable refrigerator and sample bottles shown in the accompanying illustrations were designed to meet the conditions incident to shipping samples long distances to the Kansas State Water Survey Laboratory and to conform to the requirements of the Standard Methods, American Public Health Association.

Pressed ground cork is the insulating material used in these containers and it is moulded in one piece. The inside lining is eight ounce tinned copper seamed and soldered. The outside protective covering is twenty-eight gauge galvanized iron. The copper box that carries the sample bottles is provided with a movable partition so that one, two three or four samples may be shipped safely. The box is suspended from the lid of the refrigerator by two hooks and a catch. When the catch is closed and the lid fastened in place, it is impossible for the catch to come unfastened until the lid is removed.

The bottles are held snugly in place in the upper portion of the container. The space below is large enough to hold six or seven pounds of ice. The outside dimensions of the refrigerator are sixteen inches high and twelve inches in diameter. The inside dimensions are twelve inches in depth and eight inches in diameter. The weight without ice or water samples is seventeen pounds. Packed for shipment with four samples, the case weighs twenty-four pounds, thereby coming under the thirty-cent limit of express tariff "K."

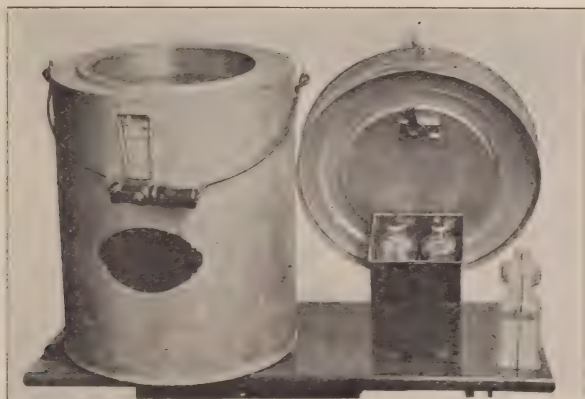
In case this container should be tipped over in shipment, there is sufficient space so that the water from the melted ice will not come in contact with the sample bottles.

One of these refrigerators was placed in a 37° incubator, and it was found that six pounds of ice would keep samples under 10° for thirty-four to thirty-six hours, depending on the size of the pieces of ice used in packing.

The sample bottle holds six ounces. One face is ground so that the description of the sample can be written on the bottle. The top of the ground space serves as a graduation for four ounces of water, thus allowing for an air space above the sample. The stoppers and bottles are numbered and each stopper is ground to fit.

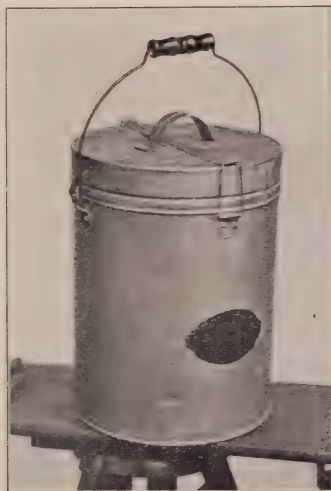
The special feature of this bottle is the design of the stopper. The stopper proper is partially protected by an overhanging hood. The hood,

however, has for its chief purpose the protection of the neck of the bottle. The handle is notched to hold a strong rubber band and is heavy enough so that if the stopper is laid down, the portions coming in contact with



the water will be held away from the surface on which the stopper is placed.

Twelve dozen of these bottles have been in use three months. In that time only six have been broken in sterilizing, two in shipment and four in collecting samples. In practice the bottles are washed with chromic acid



cleaning mixture, rinsed, dried, and then sterilized in a dry oven at 180° to 200° C. for an hour.

Fifty of these outfits are in constant use by the laboratory at present.

Date.	City.	Distance from Lawrence.	Hours en route.	Maximum temp. at Lawrence.	Condition on arrival.
June	5 Marysville.....	134*	48	90.2° F.	Below 10° C.
	5 Hutchinson.....	194	24	90.2	Below 10° C.
	5 McFarland.....	53*	48	90.2	Below 10° C.
	7 Burlington.....	73*	48	76	Above 10° C.
	10 Excelsior Springs.....	55*	20	75	Ice.
	11 Manhattan.....	80	20	80	Ice.
	13 Concordia.....	171*	48	83	Below 10° C.
	16 Bonner Springs.....	22	10	93	Ice.
	17 Clearwater.....	219*	46	94	Below 10° C.
	18 Marysville.....	134*	12	102	Ice.
	24 Ottawa.....	27	10	93	Ice.
July	1 Chanute.....	161*	36	87	Below 10° C.
	2 Medicine Lodge.....	296*	24	91	Below 10° C.
	3 Norton.....	292*	34	94	Above 10° C.
	3 Piqua.....	154*	24	94	Below 10° C.
	9 Leavenworth.....	34	24	92.5	Below 10° C.
	11 Dodge City.....	327	24	96	Ice.
	12 Lucas.....	203*	24	91.5	Below 10° C.
	12 Lebanon.....	207*	64	91.5	Above 10° C.
	15 Holton.....	50*	24	103	Ice.
	15 Marysville.....	134*	24	103	Ice.
	15 Kingman.....	227*	24	103	Ice.
	16 Wilsey.....	89*	36	102.5	Above 10° C.
	17 Atchison.....	71*	48	101.5	Above 10° C.
	17 Burlington.....	73*	24	101.5	Below 10° C.
	19 Pratt.....	267*	48	88	Above 10° C.
	21 Ottawa.....	27	10	86	Ice.
	22 Neodesha.....	196	26	85	Ice.
	23 Paola.....	82*	24	92	Ice.
	23 Great Bend.....	244	24	92	Ice.
	24 Pittsburgh.....	216*	24	81.5	Ice.
	24 Humboldt, Nebr.....	177*	24	81.5	Below 10° C.
	24 Cherokee.....	175*	48	81.5	Below 10° C.
	24 Mankato.....	198*	48	81.5	Below 10° C.
	24 Iola.....	95*	24	81.5	Below 10° C.
	24 Larned.....	267	24	81.5	Ice.
	24 Russell.....	224	24	85	Ice.
	25 Wichita.....	187	24	85	Ice.
	25 Osawatomie.....	100*	24	85	Ice.
	26 El Dorado.....	163*	24	96	Ice.
	28 Winfield.....	217*	24	95.5	Ice.
	30 Caldwell.....	234*	48	100.5	Below 10° C.
	30 Chanute.....	161*	24	100.5	Below 10° C.
	30 Lansing.....	39*	16	100.5	Ice.
	30 Burr Oak.....	271*	28	100.5	Ice.
	30 Almena.....	282*	24	100.5	Ice.
	31 Syracuse.....	429	24	87	Ice.
	31 Onaga.....	58*	24	87	Ice.
	31 Olathe.....	58*	24	87	Ice.
	31 Florence.....	132	24	87	Ice.
	31 Baileyville.....	184*	24	87	Ice.
	31 Waterville.....	170*	72	87	Above 10° C.
	31 Oswego.....	191*	24	87	Ice.

New Shipping Outfit for Iced Water Samples 453

Date	City	Distance from Lawrence	Hours en route	Maximum temp. at Lawrence.	Condition on arrival
Aug. 4	Atchison.....	71*	36	103.5° F.	Below 10° C.
5	Topeka.....	27	8	104.5	Ice.
5	Burr Oak.....	271*	24	104.5	Below 10° C.
5	McPherson.....	179*	24	104.5	Ice.
5	Sabetha.....	86*	60	104.5	Below 10° C.
6	Wichita.....	187	20	99	Ice.
6	Sedan.....	202*	48	99	Above 10° C.
6	Abilene.....	124	16	99	Ice.
6	Chetopa.....	114*	24	99	Below 10° C.
6	Independence.....	127*	18	99	Ice.
6	Cherryvale.....	117	20	99	Ice.
7	Atchison.....	71*	10	105	Ice.
7	Ft. Scott.....	138*	24	105	Ice.
8	Washington.....	190*	24	103	Ice.
11	Garnett.....	44	10	104	Ice.
12	Wathena.....	110*	36	103	Below 10° C.
12	Kansas City, Kan.	39	10	103	Ice.
12	Marysville.....	134	24	103	Ice.
12	Neodesha.....	196	24	103	Ice.
12	Cherryvale.....	117	24	103	Below 10° C.
12	Waverly.....	54	24	103	Below 10° C.
12	Scammon.....	144*	24	103	Ice.
13	Independence.....	127*	24	101.5	Ice.
13	Atwood.....	309*	48	101.5	Above 10° C.
13	Hewins.....	175	24	101.5	Ice.
13	Mound City.....	154*	24	101.5	Ice.
13	Meade.....	331*	24	101.5	Below 10° C.
14	Marion.....	143*	24	102	Below 10° C.
14	Delphos.....	195*	24	102	Below 10° C.
14	Holyrood.....	226*	24	102	Below 10° C.
14	Burrton.....	285	24	102	Below 10° C.
14	Atchison.....	71*	16	102	Ice.
19	Chanute.....	161*	24	99	Ice.
19	Elsmore.....	142*	24	99	Ice.
19	Eureka.....	134*	24	99	Ice.
19	Salina.....	146	24	99	Ice.
20	Columbus.....	191*	24	100.5	Ice.
20	Frontenac.....	211	24	100.5	Ice.
20	Chanute.....	161*	24	100.5	Ice.
21	Beloit.....	217*	24	101	Below 10° C.
21	Concordia.....	170*	24	101	Below 10° C.
21	Holton.....	50*	24	101	Below 10° C.
26	Green.....	173*	24	102	Ice.
26	Arkansas City.....	220*	24	102	Ice.
26	Holton.....	50*	24	102	Below 10° C.
26	Hays.....	250	24	102	Below 10° C.
27	Goodland.....	399*	48	104	Above 10° C.
27	Manhattan.....	80	16	104	Ice.
27	Medicine Lodge.....	296*	24	104	Ice.
27	Ottawa.....	27	10	104	Ice.
29	Manhattan.....	80	16	94	Ice.

*Transferred in shipment.

During the summer over one hundred and fifty shipments have been received at the laboratory. About fifty containers were sent in by the state sanitary engineer and members of the Survey staff, all of which arrived at the laboratory with the samples under 10° C.

Many of the samples examined at this laboratory are sent in by County health officers, city engineers and water works superintendents. From these sources over one hundred shipments have been received. Most of the men collecting the samples and packing the refrigerator had never seen the contrivance before. The results of one hundred and four shipments by city engineers, county and city health officers and water works superintendents follow:

All but ten of the containers reached the laboratory with samples below 10° C. Sixty contained ice, thirty-four had no ice, but were under 10° C.

Of the ten not in good condition, eight were en route forty-eight hours or over. Two were on the road only thirty-six hours, but the amount of water in the bottom showed that they were not properly packed.

From these results it is apparent that when properly iced, this container will keep samples under 10° for thirty-six hours in the hottest weather.

NOTE.—These containers were manufactured by the "3 H" Co., Lawrence, Kan. The bottles were furnished by Bausch & Lomb.

BOOK REVIEWS.

A Model Housing Law. By Lawrence Veiller. *The Survey Associates, New York.* \$2.00.

The appearance of this volume is an evidence of the rapid growth of the movement for better housing in the United States. Four years ago when Mr. Veiller published "A Model Tenement House Law" the demand of the time only called for the regulation of tenement construction and maintenance. Since then we have learned that dark rooms and unsanitary conditions are just as objectionable in one- and two-family houses as in multiple dwellings. A strong sentiment is developing throughout the country that the slums must go, that the dwellings of the future, whether detached or in block, for one family or for many, shall be built in accordance with the best principles of housing construction.

The Model Law is carefully worked out to these ends. The object of all housing law is to secure suitable light and ventilation, good sanitation, adequate fire protection, decent privacy and proper maintenance in all dwellings, both new and old. Chapters are devoted to each of these subjects and also one to the necessary legal requirements and penalties, for a law without "teeth" is useless. Both the form and the substance

of the Model Law are admirable. For the first time we have a general housing law so clear and simple in arrangement that even the man on the street can understand it as he runs. Without doubt all American legislation on this subject, whether state laws or local ordinances, will henceforth follow this form. The principles embodied in the law have been tested by experience and are sound, and the provisions are so carefully drawn that they seem secure against all attack from speculative building interests. The book is illustrated with a large number of diagrams and plans showing plainly what can be built under the law, and what changes must be made in old buildings to make them conform to modern requirements. Copious notes answer most of the questions which are likely to arise in connection with such a law and add greatly to the value of the book for those who are not experts on the subject. It is indispensable for all who are seeking by legislation to improve the bad housing which is to be found in almost every city and town, and to secure right living conditions in the future for all classes of people.

Elmer S. Forbes.

City Planning: *A comprehensive analysis of the subject arranged for the classification of books, plans, photographs, notes and other collected material.* By James Sturgis Pray, chairman, school of landscape architecture, Harvard University; and Theodora Kimball, Librarian, school of landscape architecture, Harvard University—103 pages, Paper Cover. Price \$1. Harvard University Press, Cambridge, 1913.

Who better than a landscape architect with the training of practice, travel and teaching, in collaboration with an experienced librarian, could arrange a syllabus of City Planning that would be of value to those affected by the development of our towns, as well as to the bibliographer?

The long list of carefully arranged titles is, indeed, a syllabus rather than a basis for a bibliography, but that makes it all the more useful. From the point of view of public health, such headings as: education of

public, regulative legislation, coöperation of experts, hygienic aspects of planning, playgrounds, athletic fields, park systems, types of city plans distinguished by climate, suggest the variety covered.

There is a classification of the subject of housing, streets, and street arrangement, gardens, garden cities, besides an elaborate summary of all the other points of view of Town Planning. With a list of this kind, not only are suggestive titles at hand for the arrangement of literature, and the rapidly

accumulating material coincident with the work of any professional men, but there are also at hand many suggestions for further study along lines as yet insufficiently developed. This classification should be "useful alike to the municipal official, the business administrator, the civil engineer, the sanitary expert, the transportation engineer, the housing reformer, the architect, and the landscape architect, as well as the representative of any one of various other special services, in proportion as his occupation enters and contributes to the field of city planning; and the index will show him quickly at what points his special material is provided for."

In an individual classification the suggestion of checking the printed index to show the presence of material as it is classified, is so simple that it is really likely to be followed. The classification is arranged so that, although it is based on the Library of Congress classification, it can also be applied to other systems, such as the Dewey decimal classification, and a summary is given to show the possibility of inter-locking the two systems. The geographical arrangement is practically that of the Library of Congress, and there is a long alphabetic subject index.

A preliminary outline was published several months before the final analysis, for circulation among critics; Mr. Olmsted on the Data for City Planning; Mr. Flavel Shurtleff on Legislation, Professor Killam on Types of Building Construction; Mr. John Nolen, Professor Ford of Cambridge, Professors Brix and Genzmer of Berlin, and others. Their criticism has had a beneficial effect in the result.

It is undoubtedly true that it would be extremely difficult to carry out a library classification along the lines indicated for the simple reason that the books that have been published are not arranged under similar divisions. Certain of these subjects will have whole volumes to themselves, while other subjects will be grouped with surprisingly foreign material. It is somewhat startling to see wires, sewerage conduits and subways for rapid transit all classified under "channels of transportation."

It must be added that the whole analysis that is so scholarly and carefully worked out it is sure to be a reliable, if not the standard basis for future classification of the rapidly growing subject of city planning.

F. A. Bourne.

The Health Master. By Samuel Hopkins Adams. Houghton Mifflin Company, Boston and New York. Price \$1.35.

A great deal of popular literature dealing with disease prevention that has been published in recent years may be justly criticized because of some of the exaggerated and far-fetched statements that are made. Such a criticism of this highly entertaining and instructive book by Mr. Adams cannot be made. In reading it one finds no statements that are not either based on facts, or where facts are unobtainable, upon the "best rational probability and statistical support." The story centers around the family of Mr. Clyde, into which Mr. Clyde intro-

duces the "Health Master," a physician who is to keep the family well, upon the Chinese plan. The different characters are admirably sketched. The plan of the book may be understood from some of the chapter headings: Chapter VI, "The Re-Made Lady," dealing with personal hygiene; Chapter VII, "The Red Placard," on the quarantine family; Chapter XI, "The Besieged City," with an epidemic period. Health authorities could undertake no better form of popular instruction in public health than to utilize this little book.

Mark F. Boyd, M. D.

HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS

Easton, Pennsylvania.

The report of the Board of Health of Easton for the year 1913 is included in the report of the city and consists of only about sixteen pages, all told. Apparently public health work in Easton is not in a very flourishing condition, in spite of the fact that the city has a population of 30,000, and seems lively in other respects. This may be an outgrowth of the old form of city organization which has been remodeled since December 1, 1913, by the Clark Act. This act appears to constitute the mayor and council of the cities of the third class as a board of health, *ex-officio*. A single man constitutes the entire active force in health work.

It is interesting to note the relative amounts expended by the city in various lines during 1913. The Fire Department received \$27,000; the Police Department \$20,000; Garbage Disposal, \$16,000; and the Board of Health, \$1,300; or about four and three-tenths cents per capita population. Surely a disgrace to any city in our present state of civilization. Of the \$1,300, as

might be expected with so small an amount, the majority, \$834, was spent on quarantine and contagious disease; \$350 was spent in "salaries," the portion received by the health officer not being stated.

In view of the small remuneration of the health officer it is interesting to note his excellent record of 1,049 nuisances inspected, 592 houses quarantined, and 527 houses "fumigated and released." The report of the Board of Health is wholly statistical and consists largely of a monthly statement of deaths classified by the typically unsatisfactory system for which Pennsylvania cities are becoming notorious. No rates are given, but, as worked out from the figures, the birth-rate appears to be about 22 and the death-rate 18.3, although this latter probably included stillbirths. No figures are given from which the infant mortality can be obtained.

The report is signed by the city clerk and no report of constructive work nor suggestions as to necessities for future improvement are given.

Hartford, Connecticut.

The Board of Health of Hartford, through its superintendent and others, presents its annual report for the year 1913. Hartford has a population estimated at 104,634. The corrected death-rate for 1913 was 14.63. The birth-rate was 30.2 and the infant mortality rate 105.3 per thousand births. The city expends about 27 cents per capita per year for the Health Department, but this does not include the collection and disposal of garbage.

The report is especially pleasing in general appearance and in addition to the report of the superintendent of the board contains many interesting and well-prepared reports from the various members of the staff. The

sanitary inspectors report a general improvement of conditions, but urge extension of sewers, improvements in the sanitation of trolley cars and an ordinance regulating the stables of the city as means of getting still greater improvement.

Tenement inspection has been made more thorough by the employment of an additional inspector. All tenements have been visited at least three times in the year and orders have been followed up by reinspections.

The milk inspector reports 2,088 inspections during the year and has brought about an improvement in conditions both among producers and middlemen by educational work and occasional prosecutions. The milk

bacteriologist has examined 1,987 samples of milk chemically and for visible dirt. In two years, during which the dirt test has been made, the percentage showing dirt has decreased from 100 per cent. to less than 10

per cent. Publication of results is urged to stimulate further improvement.

Other reports are by the chief bacteriologist, the plumbing inspectors and the food inspectors.

La Crosse, Wisconsin.

Although the report of the city of La Crosse for 1913 is not a pretentious one it is, in general, excellent, both in preparation and in respect to the work reported. Few western cities of the size of La Crosse (estimated population 31,000) issue any annual report of the Health Department and many eastern cities, even though larger, do not issue as good a report.

La Crosse spends only \$6,000 per year for health work and \$1,640 went for garbage removal in 1913, leaving only about fourteen and one-half cents per capita for health work in the stricter sense of the word. Three thousand eight hundred fifty dollars a year goes for salaries and apparently is very profitably invested. The corrected death-rate is given as 9.0 but from the mortality report appears to be 12.7. The birth-rate is 21.3 and the infant mortality rate presents the Utopian figure of 39.3. The classification of deaths by causes would be improved by a little stricter adherence to

the International System and by more careful proofreading.

In addition to financial and vital statistics we find tabulated reports of medical inspection of schools, of visiting work by the school nurse, of sanitary inspections, and of laboratory work. This latter includes a total of 2,780 examinations of specimens; including milk and cream analyses; diagnosis for diphtheria, tuberculosis, and typhoid; and various miscellaneous analyses.

The keynote of the whole report is a plea for interest, coöperation, and constructive criticism by the citizens. Doctor Furstman, the commissioner of health, explains what he is trying to do, why it needs doing, and how the people can help. He especially requests their coöperation in the disposal of garbage and in getting an isolation hospital, so that the expense of contagious disease may be distributed among the whole population instead of resting upon those least able to bear it. His work in breaking up threatened epidemics has been prompt and effective.

North Yakima, Washington.

The report of Dr. Thomas Tetreau, health officer of North Yakima is included in the annual report of the city for the year 1913. North Yakima has an estimated population of 18,000 and spent \$20,832 in 1913 on its Health Department, which does not include \$4,378 spent by the city meat inspector and plumbing inspector. Excluding the cost of garbage collection about 62 cents per capita is spent by the Health Department.

It is unfortunate that Doctor Tetreau's report consists solely of statistics, as a more complete account of his activities would be interesting and instructive. His results speak loudly for his methods. The corrected death-

rate for the year is 7.6; the birth-rate, 14.6; and the crude infant mortality rate, 91.3. Not a single death among resident cases is reported from measles, scarlet fever, whooping cough, diphtheria, or typhoid. Only one case of diphtheria was reported during the year and this was a child brought into town for treatment at the hospital.

Among the special reports included are those of the dairy and creamery inspection; of sanitary inspection; of the food inspector, the city nurse; and the bacteriologist, the last three being women. All indicate active and effective work.

DEPARTMENT NOTES

"Vacation Typhoid."

Doctor Landis in the March 28 issue of the weekly report of the board of health of Cincinnati makes the following suggestions to the people of Cincinnati in the hope of cutting down his typhoid rate in August and September.

"Plans for summer vacations are being made by many residents of the city. Some will go to the lakes, some to the mountains, others to the seashore or the country. A large portion of these people believe that these places represent the last word in sanitation. Many of them do, but the primitive variety that spells typhoid fever, plagues of mosquitoes and flies, poor garbage and sewage disposal and sloppy service in dining-room and other portions of the hotel.

"Cincinnati's water supply is of known purity. Rudolph Hering, the great New York sanitary engineer and world-wide authority on filtration plants, has expressed the opinion that Cincinnati's results in water purification, can not be duplicated anywhere else in the world.

"Every year our population of non-immunes to typhoid fever becomes greater. Absence from the city and the use of an inferior grade of water carries a risk that all should realize. Safety can be secured by taking the typhoid vaccine treatment. It is sure in its power to confer immunity and is not attended by danger.

"Many summer resorts are distributing centers for typhoid and none should be patronized without first securing information about local conditions, special care being exercised to learn about the water supply and the methods employed in disposing of sewage and garbage.

"Hundred of people would be better off financially and safer, from a health point of view, if they remained in the city and spent their vacation in Eden Park, Burnet Woods or other parks or places of amusement where sanitary conditions are known to be all right."

Possibly we shall come to the time when summer resorts will need to be "inspected and passed" by a state board of health before they will be patronized.

The Floating Bath in New York.

The following article, clipped from the *Weekly Bulletin* of the Department of Health of New York City, is the latest development in the discussion of the possible danger to health occasioned by the use of the floating bath:

In view of the enormous extent of the sewage pollution of the waters surrounding Manhattan Island, bathing in these waters is bathing in sewage. This is not only indecent, but absolutely dangerous to health. The following letter shows the attitude of the department of health on this matter and requires no further comment:

"March 20, 1914.

"HON. MARCUS M. MARKS, President of the Borough of Manhattan, City Hall, New York:

"*My Dear Mr. Marks:*—This department has not neglected your communication of February 3d in relation to floating baths. The matter has been under careful consideration for some time and indeed was made the subject of a report by the sanitary expert of the department to the commissioner of health in December last. The subject was also under consideration during the summer of 1913 and previously.

"You are doubtless familiar with the work of investigation which has been carried on recently by the Association for Improving the Condition of the Poor. The results of that investigation are not before me, but, from a conversation with officers of the association recently, I am led to believe that this private investigation will strongly confirm the investigations previously conducted by the department; indeed, nobody can look into this question without concluding that sooner or later the city must abolish its floating baths. And if the municipal floating baths are abolished, we must, in all consistency, take steps to suppress the private baths also.

"Numerous inspections of the waters surrounding Manhattan have been made during 1910, 1911, 1912, 1913, 1914. These inspections include color tests of nearly all trunk sewers discharging into the East and Hudson Rivers. The tests prove conclusively that these waters are highly polluted with sewage.

It is estimated that 499,800,000 gallons of sewage are discharged daily from Manhattan. This sewage oscillates between Fort Hamilton and Throggs Neck, being carried back and forth by flood and ebb tides. Under these conditions the natural process of self-purification is necessarily impeded and limited.

"Chemical and bacteriological tests are not necessary to prove the extent of pollution. Personal observation along the shores of Manhattan shows the presence of fecal and other matter offensive to sight and offensive in odor.

"Typhoid cases have frequently been reported to the department, in which the history shows that the victims had bathed in the ocean, in the sound, and in the rivers about the city. Owing to the possibility of other sources of infection, however, it has not been practicable to prove beyond peradventure in these cases the relation between typhoid fever and river bathing, but that such bathing is dangerous there can be no doubt, in view of the condition of the waters.

"In my opinion, the city will be on the right road if it aims at the suppression of the river baths and the substitution for these of interior baths, properly constructed and administered. This department will do its share toward creating an intelligent state of public opinion on the subject and toward regulating the activities of owners of private baths.

"Very truly yours,

"S. S. GOLDWATER, *Commissioner.*"

Physical Examination of Push-cart Peddlers.

At the request of the Mayor's Bureau of Licenses, hereafter all applicants for licenses to peddle from push carts will be examined at the tuberculosis clinics of the Department of Health. No applicant whose sputum contains tubercle bacilli will be recommended for a license. While all applicants will be examined, irrespective of their physical condition, it is the intention to recommend for such licenses those who by reason of illness would be benefited by open-air employment. Tuberculous persons in fair physical condition, and with sputum free from the bacilli,

and others whose physical condition requires open-air employment, will therefore be given preference.

Weekly Bulletin of the Department of Health of New York, April 4.

Following Up Discharged Cases of Contagious Disease.

The *Weekly Bulletin* of the Department of Health of New York City in its issue of April 4 contains two interesting notes on the following up of cases of contagious disease which have been discharged from the hospitals of the Department of Health:

"Beginning April 1st, 1914, all cases of scarlet fever, diphtheria, and measles, discharged from the hospitals of the Department of Health, will be at once revisited by the district nurse of the Bureau of Infectious Diseases, to determine the condition of the patient on discharge (as to infectivity, etc.) and the home conditions of the family. Advice will be given as to care of convalescent patient, and, if necessary, the family will be referred to the proper charitable organization for financial aid and other assistance. At least one additional visit will be made after the expiration of the incubation period of the disease in question, to ascertain if any secondary cases have developed.

"It is the desire and intention of the commissioner of health to eventually give to this work the full force of hospital social service visiting in the complete sense of the term. This will, of course, necessitate a large staff of district nurses. The establishment of a special convalescent home for suitable cases of this kind is one of the possibilities that is being borne in mind."

"A study has recently been made to determine how effective were the precautions taken to prevent the carriage of contagious diseases into homes through patients discharged from the contagious disease hospitals of the Department of Health. Eighty-eight cases were discharged from the Kingston Avenue Hospital during the month of January and in only one instance was a contagious disease carried in this way. This was in a girl five years of age who developed scarlet

fever two days after the return of her sister from the hospital. It is planned to continue these studies and apply the experience gained to perfecting, as far as possible, the administration of the contagious disease hospital."

Health Officers' Association of New Jersey.

The regular March meeting was held in the Ridgeway House, Camden, N. J., on March 27, 1914.

The executive committee met at 4 p. m. to act on applications for membership and on other matters that had been referred to it.

The business meeting was called to order at 5 p. m. by the president, Dr. F. W. Sell, of Rahway, N. J. Various committee reports were presented, the most important of which was that relating to laws and legislation. The committee reported that a bill was introduced into the state legislature making it mandatory for boards of health to appoint a registrar of vital statistics. Another bill related to the filing of birth and death certificates of non-residents, making it mandatory upon the registrars to forward copies of such certificates to the town in which the persons resided.

A general discussion of laws relating to the exposure of food to dust and dirt, of the methods used to secure reports of cases of syphilis and of the methods used to prevent flies from breeding in horse manure followed.

Following a dinner at 6.30 p. m., Dr. William M. Welch of the Department of Health of Philadelphia gave a very illuminating address on "Scarlet Fever," with especial reference to the chief characteristics that aid in diagnosis. Dr. A. A. Cairns of the Department of Health of Philadelphia then gave a detailed account of how quarantine was enforced and how disinfection was performed in Philadelphia.

After an extended discussion the meeting adjourned.

Montclair, N. J.

C. H. Wells, Secretary.

Do They Apply to Your Own City?

The Bureau of Municipal Research after making a survey of conditions in Toronto says that, to make it a better, cleaner city, Toronto needs the following:—

"Stricter measures against overcrowding tenements.

A general clean-up day.

A municipal lodging house.

Stricter enforcement of smoke-nuisance regulations.

A house-to-house-sanitary inspection.

Elimination of railroad grade crossings.

Follow-up inspections to enforce sanitary reforms.

Removal of unsightly, abandoned buildings.

Improvement of roadways in streets occupied by municipal tramways.

Surrender of railroad property desirable from a city beautiful standpoint."

Stimulating Interest in Public Health.

"A new feature was added to the public health exhibit of the Ohio State Board of Health in Newark, when a local newspaper, the *Advocate*, undertook a health contest. Coupons were printed in each issue and these could be exchanged for attendance coupons after each public health lecture. Three attendance coupons rendered the owner eligible to enter the contest. Each person submitted ten suggestions for the betterment of health conditions in Newark, and there were three prizes offered, \$50 in all. This plan was so successful in Newark that it was continued in Zanesville and Coshocton, where it met with the same success. Not only was the attendance at the public health lectures increased but more interest was taken in local sanitary conditions, and the suggestions offered were in many cases not only interesting but of practical value."

Journal of the American Medical Association, April 11.

Where Ignorance is Bliss.

In view of the growing belief that keeping the city clean is rather a matter of decency than of public health the following clipping from the *Journal of the American Medical Association* is, perhaps, an especially interesting commentary on the intelligence of public officials when it comes to a question of public health:

"The Sandusky Board of Health recently requested the city council to put aside a certain sum of money for a public health exhibit. This the council refused to do, giving as an

excuse the fact that the duties of a board of health were not educational, and that the board would be better occupied in cleaning up the city than in attempting to place an exhibit before the people. A number of physicians and the Board of Health of Sandusky were so much impressed by the public health exhibit of the State Board of Health that they decided to continue the campaign of education along public health lines by means of a local exhibit. It was planned to have the engineer in charge of the filtration plant show how the system operates, and give a practical demonstration of the examination of water, and many other features of great local interest and importance were to be added to the exhibit. It is to be regretted that an intelligent campaign of this character should meet with failure."

Public School Health System.

"The city of Albany, New York, has developed an excellent system of health direction in the public schools, which it is the aim of the medical director to extend considerably beyond the usual concept of mere medical inspection of school children. Recently a dental dispensary has been added which aims to take care of the teeth of children who are not able to pay for the services of a dentist. A set of blank-cards has been provided for keeping record of the dental work done for the pupils. One of the cards contains sociological data concerning the family from which the pupil comes. The cards given to the children recording appointments and granting admission to the dispensary contain practical admonition to the pupil and parents as to the importance of taking care of the teeth, their influence on the physical and mental development and the bearing of proper development on future success in life, all of which should have a wholesome educational influence. The school work in Albany is an example of how a scientific foundation along lines of school hygiene can be made successful through the coöperation of progressive citizens, trained educators and child hygienists. The dental dispensary is not the least valuable department of this feature of the health work in the public schools."

International Hospital Record, April 10.

Hints for "Clean-up Week."

Rockford, Illinois, has recently had a spring cleaning. The mayor first issued a proclamation setting a certain week for the purpose and at the close of the week the city sanitary inspectors made a thorough inspection of the city and issued orders for correction of all insanitary conditions found. These orders are being enforced by reinspections.

In the *Quarterly Health Bulletin* of the city the following suggestions in regard to cleaning up were made:

"See that all rubbish is removed from your cellar, back yard and surroundings. Be clean—not merely personally clean, but clean in habits.

"Then, don't forget to ventilate damp cellars. Clean all windows and keep them open to fresh air and sunlight.

"See that all leaky roofs and bad plumbing are repaired, and do not tolerate dirty, broken walls and ceilings.

"And don't forget what plenty of soap, hot water and sunshine will do to assist you in cleaning up.

"Do not forget the attic or any remote place where flies and germs breed.

"Dry sweeping and dry dusting is a dangerous practice. Raising dust from floors and furniture to let it lodge on walls, ceilings or unnoticeable, is the cause of many infectious and contagious diseases. USE the damp broom, the oil-mop, damp and oiled cloths method of sweeping and dusting.

"Burn old waste paper and all other household rubbish at least once each week. Do this in your kitchen range, the laundry stove or furnace.

"Drain moisture from garbage before placing it in the garbage can. Provide yourself with proper garbage can as required by our city ordinance—covered can, made of galvanized iron, not less than fifteen inches in diameter and two feet high. Put this can in a readily accessible place where the garbage collector can reach it.

"Do not throw waste paper of any description on any public street, park nor in your own yard.

"Don't expectorate on any sidewalk, street car or on any floor. It is a detestable habit, breeds disease and is against the law.

"Don't let milk bottles stand unwashed

after use. Wash them at once and don't fail to rinse the bottle in cold water before scalding.

"Don't forget the stagnant pools and ill-smelling refuse piles. They breed mosquitoes and flies, and consequently disease. Keep the loose manure in covered boxes and have it carried away at least once a week.

"Remember that our *House-to-House Inspector* will examine your plumbing, cellar rubbish pile and other conditions apt to be insanitary. Carry out the above suggestions and it will be unnecessary for him to serve a notice for you to clean up.

"And remember, that cheerful compliance with these suggestions and with every other effort of the health department, will help to make our city a more healthful one to live in."

What Everyone Should Know About Hookworms.

"1. The largest hookworm is only about three-fourths of an inch long—the male a little smaller.

"2. The adult hookworms live in the alimentary tract in human beings.

"3. They lay large numbers of eggs in the alimentary tract.

"4. These eggs are passed out in the stools.

"5. Where sewage is properly disposed of the eggs are destroyed and no harm is done.

"6. But when no privy even is used the eggs are deposited on the ground where they hatch, and

"7. In a few days the baby hookworms are ready to attack the feet of any barefoot child that chances to come along.

"8. This they do by burrowing into the skin, producing what we know as ground itch.

"9. They get through the skin into the circulation, through which they pass till they reach the lungs.

"10. There they are coughed up and swallowed.

"11. When they reach the intestines they grow up to the adult hookworms, and the child begins to get pale.

"12. This child in turn begins to deposit hookworm eggs as the one before him did, and so on in an endless cycle.

"13. If you suspect your child has hookworms write the State Board of Health."

Bulletin of Texas State Board of Health, January.

The Disposal of Waste in Philadelphia.

"The Philadelphia highway bureau has asked for a detail of seven patrolmen from the department of public safety, one to be assigned to each highway district. The duties of these men are, first, to warn scavengers, and then, if the nuisance of interfering with waste put out for collection is persisted in by the scavengers, to arrest them. The act of April 20, 1905, makes it unlawful to throw waste paper, sweepings, ashes, household waste, nails, or rubbish of any kind into any street or to interfere with the contents of any receptacle containing waste. The act further provides a punishment of fine and imprisonment.

"These patrolmen are also to call the attention of householders to the Housing Act of July 22, 1913, which requires that occupants of dwellings shall provide a non-leakable receptacle of an approved standard for ashes.

"It is evident that peach baskets and such nondescript receptacles are not of an approved standard," and where ashes are put out in receptacles that are not tight and durable they are not collected. The householder is warned in advance of the housing law providing for proper receptacles by the distribution of Call for Waste cards, left at every house by order of the bureau.

"It is hoped by this means to eradicate the very distressing evil existing in Philadelphia as well as other cities of littering sidewalks and streets by the careless way in which waste is put out for collection. The Call for Waste card is designed to hang in the front window or in a conspicuous place in front as a notice to the collector to call either at the front or rear of the building for the waste and thus do away with the necessity of putting it out on the sidewalks. This does not refer of course to ashes which must be deposited in proper receptacles on the sidewalk for the collector.

"In addition to this work being carried out by the bureau, Mrs. E. W. Pierce has been appointed to get the cooperation of householders and school children in preventive street cleaning work, by means of addresses at public meetings and women's clubs and talks in schools at assembly. Following these instructions the children put them into effect at home and write compositions expressing their ideas in regard to cleanliness

and health. For any specific work, no matter how small, or for ideas expressed in writing, the children are awarded badges as volunteer inspectors, and this responsibility is greatly appreciated by the boys and girls."

National Municipal Review, April.

The State Control of Disease in Minnesota.

Public Health Reports for April 24 prints the following regulations promulgated by the Minnesota State Board of Health which have several features of interest:

"Physicians in all parts of the state are required to notify immediately the division of epidemiology of the State Department of Health by telegraph or telephone whenever they discover cases or suspected cases of the following-named diseases:

Actinomycosis.	Paragonimiasis.
Anthrax.	Paratyphoid fever.
Dengue.	Pellagra.
Asiatic cholera.	Plague.
Dysentery:	Rabies (human cases and
(a) Amebic.	exposed persons).
(b) Bacillary.	Rocky Mountain spotted
Glanders.	(or tick fever.)
Hookworm disease.	Trichinosis.
Leprosy.	Typhus fever.
Malaria.	* Yellow fever.

"The use of the telegraph and telephone permits the information to reach the division of epidemiology without delay and makes it possible for the State Department of Health to send immediately an epidemiologist to investigate the case and to see that such precautions are taken that other individuals will not be endangered. The diseases required to be notified in this way are those which are communicable but not very common in the state. Requiring the notification of suspected cases, as well as those in which the diagnosis has been established, saves the physician considerable annoyance, as he does not need to delay making his report until he has been able to entirely satisfy himself as to the nature of the disease. It also enables the physician in case of doubt to secure in consultation the services of a state epidemiologist."

"Little Mother's" Training Course

"The first movement toward the establishment of a Little Mothers' League in Detroit public schools was made in November, 1911. Classes were formed in McMillan, Wilkins and Bishop schools from the seventh and eighth grades and limited to ten members in each class, so that individual attention could be given each member. Half hour classes were held each week at the close of the regular school session and were not compulsory, but such good results have been attained that it is hoped to have the work eventually placed in the regular school curriculum.

"The members of the League have been most enthusiastic and requests have come from the girls to continue the lessons or repeat them.

"The lessons are made as simple and instructive as possible, practical demonstration as well as theory being given. The course is divided into six lessons, as follows:

1st. *Infant Hygiene*—

"The value and necessity of sunshine, sleep, proper food, clothing and cleanliness.

2d. *Clothing*—

"Proper outfit exhibited and reasons given for having loose, soft, warm and simple clothing.

3d. *Bathing*—

"How to prepare for bath, articles necessary, temperature of the room and water, and position in which to hold baby.

4th. *Bath Demonstration*—

"Using a large doll and regulation baby tub, giving bath in full detail, and dressing doll.

5th. *Feeding*—

"Laying special emphasis on the fact that mother's milk is the best food for baby; the necessity of consulting a physician for formulas; how to keep feeding bottles and nipples clean; care of clean, cool milk—milk to be kept clean and cool; dangers of using pacifiers, long tubes between bottles and nipple, of giving baby tea, coffee, patent medicines; precautions to take when baby has diarrhoea.

6th. *Review*—

"Going over each important point carefully, instructing the member to write an

essay on 'How to Keep the Baby Well,' which effort is rewarded by the presentation of a certificate."

Bulletin of Detroit Board of Health, March.

Special Course in Vital Statistics in Kansas.

The Extension Division of the University of Kansas has completed arrangements for a course of study in vital statistics and demography, particularly for local registrars, health officers, and physicians, sanitarians and engineers.

It is designed in this course to bring out the proper methods of determining the movements of population by studying the elements which influence its movements; the uses of vital statistics from both a legal and sanitary standpoint; methods of figuring death rates; methods of correcting or standardizing death rates; some work in the arithmetic of inexact numbers and the laws of probability, and the classification of the causes of death. The course will be made in eight assignments.

Arrangements have been made with Doctor Wilbur of the Division of Vital Statistics, Bureau of the Census, to send the 1911 report of this Division without charge to all students of this course, which report will be used in the form of a text book.

Mr. W. J. V. Deacon, the state registrar has written to the county and municipal officers urging them to take advantage of this opportunity. He points out that

"Without an understanding of this important branch of the work there can be no really efficient public health service, and it is to be hoped that many of the health officers of Kansas will avail themselves of this somewhat exceptional opportunity to familiarize themselves with the technique of vital statistics in order that they may prepare comprehensive reports of their counties, not only for the benefit of the counties themselves, but for their own benefit as well."

All communications with regard to the course should be addressed to the University Extension Division, University of Kansas, Lawrence, Kansas.

Health Epigrams.

"Good health is every one's privilege.

"An ounce of efficient achievement is worth infinitely more than a moral explosion.

"A thousand people are engaged in lopping

off the branches of evil to one engaged in axing at its root.

"Only because we are accustomed to this waste of life and prone to think of it as one of the dispensations of Providence, that we go about our business little thinking of the preventive measures that are possible.

"The hog is fortunate in being an animal of commerce. If it were not, the waste of hog life would doubtless exceed that of human life.

"If it is right for the state to appropriate money for the *relief* of distress it is certainly right for the state to appropriate money for the *prevention* of distress, which means prevention of disease.

"A city's reputation may not be built upon its good health, but there is nothing which will ruin its reputation more quickly than its bad health."

Buffalo Sanitary Bulletin, February 28.

Boston Saves School Children.

"Does it pay to give physical examinations to school children and to advise them and their parents of any impairments that may be found?

"The city of Boston answers in the affirmative and gives results that are most convincing.

"Last year Boston's 87 school physicians under the direction of Dr. W. J. Gallivan, examined nearly 120,000 school children. Of these about 40,000 or one third, were without defects and about 80,000 had defects that needed medical attention.

"The special feature of the work of the year was an attempt to find out how many defects were corrected through the initiative of parents, after they had been notified by the school physicians.

"Results at the end of the year another examination was made and it was found that 70 per cent. of the defective palates had been attended to, 74 per cent. of the skin diseases, 25 per cent. of the defective teeth, 43 per cent. of the bad tonsils, 66 per cent. of the malnutrition, 65 per cent. of the nervous diseases.

"There are many cities that are neglecting the health of their school children. They do not seem to be sure that it would pay. Why should they hesitate longer?"

The Human Factor.

Safeguarding the Milk Supply.

Believing that a high bacterial count in milk indicates possible danger whether due to dirt or to age and insufficient refrigeration, and that much of the summer diarrhoea of infants is as much due to bad care of milk by the consumer as to improper conditions of production, the Department of Health of Rockford, Illinois, issues the following "Warning" through its *Quarterly Bulletin*:—

"If our milk supply were clean and cooled immediately after being drawn, and kept ice cold until consumed; if flies were excluded from the babies and what they eat, and the babies given a carefully selected milk diet—then gastro enteritis, diarrhoea of infants, would practically disappear.

"Milk as a single article of food ranks pre-eminent, and therefore should be protected against contamination. While it is common knowledge that bacteria grow very rapidly in warm milk, yet it is often allowed to become warm by careless milkmen and indifferent consumers. When milk gets warm the bacteria double every twenty minutes—imagine the enormous growth when allowed to become warm and remain so for any length of time.

"See that your milkman has his milk iced. If not, telephone his name and license number to the health department.

"Safeguard yourself and children by keeping your milk ice cold. Don't allow your baby to drink milk that has not been properly cooled and kept cold until consumed.

"Milk requires careful handling at all seasons, but special care during the hot weather. The greatest essentials in the production of good milk are—cleanliness and proper handling. Keep the milk cold and keep it covered. Do not let it stand in the sun after delivery by the dealer, but place it immediately in the icebox."

Health Officers Conference of Louisiana.

The State Health Officers of Louisiana held a conference in New Orleans, Monday, April 20, pursuant to the call of Dr. Oscar Dowling, president of the State Board of Health. As mayors of cities and towns and

presidents of police juries (the county legislative body) in Louisiana are fiscal agents of health appropriations, they were invited.

The number in attendance was large, every section of the state being represented.

Two phases of local work were emphasized, the application of the law, and practical means of improving local service.

Dr. William C. Woodward of Washington discussed "The Functions of Legislation in the Conversation of Public Health," and Dr. B. S. Warren of the United States Public Service, "The Effects of Industrial Conditions in the Protection of Diseases." Dr. Oscar Dowling presided.

The position of secretary to the board of health and city health officer of the city of Cumberland, Allegany County, Maryland, will be vacant after May 1, 1914. Applicants must be trained sanitarians and bacteriologists, devoting their entire time to the office. A good salary is provided. File applications with, or write for further information to, the Board of Health, Cumberland, Maryland.

A superintendent is wanted for the Chicago Municipal Tuberculosis Sanatorium which is now nearing completion. It is planned to open the institution before the end of the year 1914. The initial capacity will be 600 beds; ultimate capacity 900 beds.

The sanatorium is situated on a 160-acre tract of land near the city limits. In planning the institution, the utmost effort has been made to incorporate into it all the modern administrative and medical provisions. In its medical arrangements are included a comprehensive laboratory provision, X-ray rooms, and all other modern facilities essential to the thorough study and efficient treatment of tuberculosis cases.

This is an excellent opportunity for a good medical man of right attainments, experience and executive ability. The position will be filled at an early date. Salary \$5,000 a year and quarters and subsistence. Application should be made to the president, Chicago Municipal Tuberculosis Sanatorium, 105 West Monroe Street, Chicago.

PUBLIC HEALTH NOTES.

Conference on Betterment of Hygienic Conditions Among Negroes.

Betterment of negro health was the subject of a conference of Southern health and educational officers, held in New Orleans, April 24.

The meeting was called by Dr. Oscar Dowling of the Louisiana State Board of Health. Five states and the District of Columbia sent delegates. Eight of the leading negroes of the South were present.

To agree in practical measures for ultimate and immediate betterment was the purpose of the conference. Speakers and visitors were unanimous that the call was timely and that the need for concerted action is imperative.

After lengthy discussion resolutions embodying the sense of the convention as to pertinent and practicable measures were adopted. They are as follows:

Recognizing that sanitary conditions now prevailing among negroes are susceptible of improvement and that for the health, welfare and prosperity of both races immediate effort for betterment should be made:

Be it resolved, That the responsibility of instituting and executing measures to this end is largely that of the white man;

That the active coöperation of the more intelligent negroes should be asked and their services utilized as far as possible in executing the plans adopted and in enlisting the coöperation of others of their own race;

That one point of attack should be on prevailing insanitary housing conditions, the main remedy being to enforce rigidly sanitary regulations pertaining to the disposal of night soil and other wastes, provision of a wholesome and adequate water supply, ventilation, and light;

That each state and municipality make definite effort to obtain exact information as to the prevalence of tuberculosis, venereal and other diseases among negroes; that practical preventive measures applicable to local conditions be instituted; that the data gathered be transmitted to the local and state health officers;

That instruction, definite and persistent, in the primary principles of health be given, special features of the systematic work to be a program on health topics in every negro school in the state and sermons and talks on sanitation in every negro church at frequent intervals;

That teachers be asked to emphasize in every possible way, in discipline and in methods of teaching, the element of self-control;

That visiting district nurses should be employed;

That a copy of these resolutions be sent to each state and city board of health with the request that definite action be taken to carry these recommendations into effect;

That the American Medical Association, the American Public Health Association, the Southern Medical Association, the Southern Sociological Congress, the Southern Commercial Congress, the National Educational Association of America, the National Housing Association, the Federation of Women's Clubs, and other health and educational organizations, be requested to establish standing committees on the health of the negro.

(Signed)

WM. C. WOODWARD, Washington, D. C.

JAMES A. HAYNE, S. Carolina.

C. W. GARRISON, Arkansas.

T. F. ABERCROMBIE, Georgia.

JNO. C. BELL, Memphis, Tenn.

HERMAN OECHSNER, Louisiana.

THOS. A. ROY, Louisiana.

S. R. MALLORY, Kennedy, Fla.

OSCAR DOWLING, Louisiana.

Safeguarding Marriage.

Public Health, the monthly publication of the Michigan State Board of Health, contains in its March issue several of the papers delivered at the recent National Race Betterment Conference. The following is quoted from the remarks of Dean Sumner of Chicago who spoke on "The Health Certificate as a Safeguard against Vicious Marriage Selections."

"If a man wishes to sell bananas from a push-cart in Chicago" began Dean Sumner, "he must bring a citizen with him, when he applies for the license to testify as to his good character. But if the same man desires to marry and raise a family, he can go alone to the city hall and secure his marriage license without even so much as a question being asked.

"Because no attempt has been made to safeguard marriage, except in late years, the country now has three million insane persons and criminals locked up in its institutions, at a cost of \$200,000,000 annually.

"There are three ways to safeguard the marriage relation: First, by agreement among those who perform the marriage ceremony; second, by legislation; and third, by education. The latter method promises the earliest results.

"The boys of this country are learning that they have a calling just as sacred as the call to motherhood and that is the call to fatherhood. The boy can be taught sacredness of his body at his mother's knee. The parents who neglect such teaching are omitting a great opportunity.

"Mothers, take your boy to your heart and say: 'Somewhere, my boy, some mother's little girl is keeping herself pure for you; aren't you willing to keep yourself pure for her?'"

Preparing Turbidity Standards.

"Correcting silica turbidity standards prepared by weight by the use of a field method, as outlined in the standard methods of the American Public Health Association, is criticized, as being impossible of duplication by Francis D. West, chemist, Bureau of Water, Philadelphia, in a paper presented at the recent meeting of the Illinois Water Supply Association. He suggests, as an alternative, a method found satisfactory since its adoption in the Philadelphia laboratories in 1901. This method involves the preparation of diatomaceous earth. The Philadelphia method is to take a weighed amount of finely ground material, about 2 grams, and suspend it in 500 cu. cm. of distilled water, shaking vigorously for two or three hours. After

suspending for ten hours the supernatant liquid is decanted and the residue dried and weighed. The difference equals the amount in suspension. This is diluted to standard and used as stock. Mr. West states that standards so made from different stocks do not differ perceptibly, as all material that remains suspended for ten hours appears to be of the same degree of fineness. Standards made in 1907 containing a small amount of mercuric chloride have not been found to change, but checks should be made every six months.

"To do away with the tedious grinding of the diatomaceous earth, the experience of preparing stock solutions with fuller's earth, first brought out by Dr. E. C. Levy, was also given by Mr. West. Five grams of sifted material, or 20 grams of unsifted fuller's earth, are agitated as above in a gallon bottle with one quart of distilled water. After ten hours the material in the suspended matter is determined by precipitation with a known amount of aluminum hydrate. Working them with a definite weight and definite degree of fineness, standards have been made of the fuller's earth which check exactly with the diatomaceous earth."

The Engineering Record, April 25.

Pure Water for Swimming Pools.

The Surveyor in its issue of April 17 contains a note on a proposal which has been submitted to the Nottingham City Council for the treatment of water for swimming pools where the conditions resemble those of the New York Floating Baths. We quote as follows:—

"Briefly stated, the scheme ensures a continual flow of water from rivers or other watercourses through swimming baths without loss or waste of water, in combination with a mode of filtering and heating the water. While the scheme is devised primarily for baths already existing, or to be built, in proximity to a watercourse, the principle is adaptable to premises not so favorably situated. Swimming baths by the riverside are not by any means uncommon, but, as Councillor Pollard points out, no attempt is made to filter or heat the water

used by them. They are often objectionable, and even unsafe, owing to the muddy river bed, while people too weak or delicate to use cold water baths are necessarily compelled to forego the pleasure of a swim, except in warm weather. Councillor Pollard hopes to induce the Nottingham Corporation to adopt his invention. If they do so the result will be watched with interest."

Government Hospitals for Southwest.

Bills have been introduced in the United States Senate and House providing for the use of abandoned military reservations and other government property in the southwest for tuberculosis hospitals for indigent consumptives. The hospitals are to be operated under the direction of the United States Public Health Service, the regulations for the administration of the institutions to be issued by the secretary of the treasury. The bills also provide that the United States Public Health Service hospital at Fort Staunton, N. Mex., may be used for any indigent consumptives who "have contracted their infection in another state and who by reason of their affliction are a menace to interstate commerce."

These bills have been introduced at the instigation of a committee of ninety-nine appointed by Governor Colquitt of Texas in accordance with a resolution of the Southwestern Tuberculosis Conference. The Texas Public Health Association is carrying on an active campaign for their passage.

The bills are an attempt to solve the difficult problem of the care of the non-resident indigent consumptives in the Southwest. The supporters of the measure believe that the constant influx of tuberculous persons without means into the states of Texas, New Mexico, Colorado, Arizona and California, who are attracted by the climate, constitutes a problem which is interstate in its proportions and which should be treated by the Federal authorities as such. In a brief prepared to further the bill, the following statements are of interest:

"The states and cities of the Southwest cannot care for these unfortunates. They do not, as yet, adequately provide for the

care of their own sick. The states and cities from which these people come do not aid them. The people of the United States as a whole should act to assist these consumptive citizens of the nation, but of no state or city. The Federal government should provide hospitals for tuberculosis as a matter of common humanity and for the prevention of disease."

The health records of one city in Texas for twenty-three years show a total of 34,608 deaths from all causes, of which number 6,959, or 20 per cent., were reported to have been caused by tuberculosis. Of the 6,959 tuberculosis deaths 2,282, or 33 per cent., had lived in the city less than six months prior to their decease, *the most dangerous period of their illness from the standpoint of infection of others*. Four thousand sixteen cases lived in the city less than three years prior to death, showing that they either came to the Southwest too late to be benefited by the climate or lacked proper care to restore them to health.

The Cause of Pellagra.

The Tropical Diseases Bulletin in its issue of March 30 contains a large number of reviews of recent articles on pellagra. From it we quote the following:—

An article entitled "Pellagra and the Sand-Fly" by S. J. Hunter in the *Journal of Economic Entomology*.

"The results of an investigation on the relation of pellagra to the presence of sand-flies in Kansas are recorded. The following facts have been ascertained:—(1) The number of sand-flies has been directly proportional to the number of cases of pellagra, while the first appearance of the cases coincides with the principal broods. (2) Sand-flies which are fed on human blood live several days longer than those which have not been so nourished, thus favoring an incubation period of a parasite if such there be. (3) The presence of pellagra in Kansas has been confined almost entirely to one restricted locality. Of nine cases recorded last year, five were traced back to one town in which flies are usually abundant.

"These observations support the Sambon

theory, but against this theory is the fact that pellagra has never been produced in any other animal experimentally, either through inoculation or through transference by means of sand-flies.

"Since nearly all the cases of pellagra were in natives who had never been out of the state, the cause of pellagra exists in Kansas."

An article, entitled "Pellagra in Nyasaland," by H. S. Stannus in the Transactions of the Society of Medicine and Hygiene says in part:—

"Males were found to be more commonly attacked than females. The gangs of prisoners are employed chiefly in road-making and in clearing the streams in Zomba. The women, all non-pellagrous, are employed close to the prison.

"The prisoners' diet consists generally of rice; out of 131 pellagrous prisoners only four ate maize. Maize theories of causation are therefore excluded, but the facts observed are still consistent with an intoxication by damaged rice or grain, or with some deficiency in a grain diet consisting of rice or maize."

An article by Siler, Garrison and MacNeal, entitled "Pellagra: A Summary of the First Progress Report of the Thompson-McFadden Pellagra Commission," from the *Journal of the American Medical Association*.

"The Commission report that a study of the prevalence and distribution of the disease and of the dietary of the pellagrins and non-pellagrins in the same district gives no support to the view that the ingestion of maize (good or spoiled) is the essential cause of pellagra. A striking feature is the high incidence of the disease among females of the cotton mill village population between 19 and 45 years. Poverty of nutrition, child birth, tuberculosis and other weakening causes play important rôles as predisposing factors. The higher incidence of pellagra in the more populous districts and the indication of its occurrence in definite foci support the view that pellagra is a specific infection communicated from person to person, transmitted possibly by the blood-sucking insect *Stomoxys calcitrans*, possibly by the contam-

ination of the food or by some other means as yet unknown."

An article entitled "The Cause of Pellagra" by L. Loftin in the *International Journal of Surgery*.

"The author has met with nine cases of pellagra recently in which careful examination of the faeces was carried out, with the result that hookworm or hookworm eggs were found in every case. A history of hookworm infection was secured in every instance and it is pointed out that pellagra is always present where there is hookworm! The suggestion advanced is that pellagra and hookworm infection may be the same condition with different names, pellagra being regarded as the result of a 'latent hookworm poison.' No typical skin lesions were present in these cases. [The great prevalence of hookworm infection in some localities, e.g. 90 per cent. infected, makes it necessary to examine a large number of controls before assuming that pellagra or any similar condition can be attributed to hookworm infection.]"

American Open Air School Association.

At a meeting held in Philadelphia on April 25, this new national association was formed. The following resolutions were adopted:

WHEREAS, One problem confronting mankind is the conservation of the child, and

WHEREAS, The vitiated atmosphere of the ordinary schoolroom is a cause of physical and mental sub-normality in children.

Resolved, That the time has come for a comprehensive study of the effects of open window class-rooms and open air schools, on normal children;

Resolved, That the persons who, by virtue of their daily opportunity to observe the results of the practical application of the theory of the fresh air class-room, are best qualified to do this work; Therefore, the representatives of such schools, in meeting assembled, hereby organize the American Open Air School Association.

Resolved, That we commend this society to thoughtful individuals, scientists, educators, health officials, and all local and national bodies working for child welfare.

The following were chosen as officers for

the ensuing year: President, Dr. Allen G. Rice, Springfield, Mass.; vice-president, Dr. William H. Peters, Cincinnati, Ohio; secretary, Dr. Walter W. Roach, Philadelphia; treasurer, Mr. Albert H. Raub, District superintendent of public schools, Philadelphia.

Imhoff Tanks for Baltimore.

"An extension to Baltimore's sewage treatment works at the Back River is soon to be made. Calvin W. Hendrick, chief engineer of the sewerage commission, announced last week that the city will build a series of Imhoff tanks on a site adjacent to the present hydro-lithic and sludge-digesting tanks. The new tanks will not replace the present ones but will be in the nature of an enlargement of the existing plant. The contract and specifications for the new tanks were approved by the Board of Awards on March 25 and bids for construction will be received until April 15. When the tanks are completed an exceptional opportunity for comparing their operating results with those from the present works will be afforded."

The Engineering Record, April 4.

Experts Report on Chicago Refuse-Disposal Plant.

"Provision for a \$3,500,000 municipally owned refuse-disposal plant, consisting of a central reduction plant and small incinerators at each loading station, was recommended to the Chicago City Water Commission on March 31 by Irwin S. Osborn and John T. Fetherston, consulting experts, in their report to the city. It is recommended that household separation be employed and wharf connections made with the central plant. A complete remodeling of the loading stations, an increase in the number of stations, and the employment of a technical staff were also suggested."

A brief summary of this report is given in *The Engineering Record* of April 11.

Federal Studies of Sewage-Treatment Methods.

"In the past the United States Public Health Service has confined its activities very largely within medical limits, but of late the

scope of its duties has been broadening. Among the first indications of its entrance into new fields were its stream-pollution studies, and now comes the announcement of an important program in the specialized field of sanitary engineering. This action was foreshadowed some months ago when Prof. Earle B. Phelps gave up his consulting practice in New York to enter the government service at the hygienic laboratory in Washington. Since his appointment he has been formulating plans and organizing a staff for the study of certain phases of the sewage-treatment problem. Although it is still too early to discuss the plans in detail it can be said that the investigations will cover two separate subdivisions of the general subject. The first subdivision—the design of works for the treatment of domestic sewage, with particular reference to plants for dwellings, hotels, institutions and very small communities—is in charge of Leslie C. Frank, a former member of the technical staff of Dr. Karl Imhoff. The second subdivision, which will deal entirely with the matter of trade wastes, is in charge of H. B. Hommon, who carried out the recent sewage-treatment studies at Akron and Cleveland.

"Coming at a time when the pollution of the Great Lakes along the boundary line between the United States and Canada is under investigation by the International Joint Commission, whose expert, Dr. Allan J. McLaughlin, is also an officer of the Public Health Service, the action of the service is significant, for it is the latest manifestation of Federal interest in the subject of sewage treatment as distinguished from the sanitary survey of waterways. The earlier work has been largely in the nature of a diagnosis, although the United States Geological Survey has published several water-supply papers treating of sewage-disposal methods. The new studies deal with the cure.

"A great deal of educational work will be required in this country before the problem of river pollution and sewage treatment can proceed along rational lines. This educational work is part of the program of the service. It is not proposed to usurp in any

way the functions of consulting engineers, but rather to bring the smaller towns, with limited financial resources, to a realization of the sanitary problems which they must eventually face and to emphasize the importance of securing expert advice before embarking upon any project for the correction of nuisances. If the Public Health Service can be instrumental in creating a sentiment which will make for the rational design of treatment works and operation under competent supervision it will have performed a valuable service and have prevented the squandering of vast sums on illadvised plans."

Engineering Record, April 11.

Licensing the Movies.

The growing popularity of the "cinemas" in England has led to the action noted in the following clipping from *The Medical Officer* of April 11.

"Acting on a suggestion of Dr. D. Morley Mathieson, M.O.H., the South Shields town council have decided that at the next licensing of picture halls in the borough clauses be inserted to secure the following: (a) That the local health authority, acting through the health committee on the advice of the medical officer of health, have power to require the exclusion from all performances in picture halls of children under 14 years of age, whenever in the opinion of the authority this step is desirable, and for such period as may appear to be necessary, with a view to preventing the spread of infectious disease. (b) That the arrangements for ventilation, natural lighting, and cleansing be adequate, and be carried out to the satisfaction of the the medical officer of health. (c) That 'continuous performances' of more than four hours' duration be prohibited."

Royal Commission on Venereal Diseases.

The work of the British Royal Commission on Venereal Diseases promises to be of such great importance that the opinions expressed at the various meetings are worthy of consideration. We clip the following from *The Medical Officer* of April 11:—

"At the twenty-seventh meeting of the

Royal Commission on Venereal Diseases evidence was given on behalf of the Society of Medical Officers of Health by Dr. Chalmers, the medical officer of health for Glasgow and president of the society, and by Dr. Parkes, medical officer of health for Chelsea.

"They drew attention to:—

(1) The lack of exact information regarding the present prevalence of syphilis and other venereal diseases either as causing illness or death.

"(2) The misleading or incomplete character of certified causes of death, particularly of the remote causes in death from diseases of the nervous or circulatory system.

"(3) The absence generally of any systematic provision for the recognition and treatment of the diseases in question.

"(4) The relationship of syphilis to miscarriages, still-births and deaths among infants in the first year of life, especially the first four weeks.

"They recommended that the Local Government Board should issue an order declaring venereal diseases to be endemic diseases threatening the health of the population, and that the board should make regulations governing the provision of facilities by the local authorities.

"It was necessary, they thought, that the local authorities should be assisted by a considerable grant in aid from government funds."

First Aid in Railway Accidents.

The following brief note in regard to the German method of ameliorating conditions in railway wrecks is clipped from the April 11 issue of the *Journal of the American Medical Association*:

"German railways provide a first-aid train in case of railway accidents. It consists of a locomotive and two cars, the one a work car with workmen and all necessary apparatus for clearing the tracks, releasing wounded people who are caught in the wreckage, repairing the track and setting traffic in motion again. The other is a hospital car, provided with all necessary instruments for emergency operations, bandages, dressings, medicines, operating table, stretchers and

eight beds in which patients can be transported to the nearest hospital. The personnel of these cars, workmen, doctors, nurses, etc., are all within call so that they can be reached very quickly after news of an accident is received, and they have drills in practice so that when an actual call comes they are expert in preparing for action quickly, sterilizing, getting operating and anesthesia tables, sutures, instruments, etc., ready. Every preparation is made on the way to the scene of the accident, so that they are ready to begin work when they arrive. These trains are stationed at frequent enough intervals along the road, so that the most isolated spot can be reached within two hours after an accident has occurred. Dr. Gilbert describes their work in *Archiv für Rettungswesen*, 1913, i, 140, and gives a further account not only of the medical work but of the work of the train crew in notifying oncoming trains, sending word to the railway officials and families of the dead and wounded, clearing the tracks for traffic and all the multitudinous details that have to be attended to in such catastrophes."

Pure Ad Bill Passed.

"The municipal assembly at St. Louis has passed the Pure Ad bill, making fake ads illegal. The bill had the indorsement of the St. Louis Medical Society, the Advertising League of St. Louis and other civic bodies. The bill was opposed by optometrists, the publisher of a medical journal and some retail merchants. The bill fixes a penalty of \$100 to \$500 for violation, and applies to all forms of advertising."

Journal of the American Medical Association, April 25.

London's Health in 1912.

The *Medical Officer* of April 18 contains a brief note of the report of the medical officer of health of the county of London for 1912. From this we clip the following:—

"The population of the county of London, estimated at the middle of 1912 at 4,519,754, is that of some continental nations, and this large number is so crowded together that there are no less than 38,000 persons living

on each square mile within the administrative area of the county council, which is 75,000 acres in extent. The number of children born during the year was 110,353, and the deaths numbered 61,100. Either of these numbers are equal to the population of a good-sized city. The birth-rate, 24.5 per 1,000, and the death-rate, 13.6 per 1,000, were each lower than those recorded in any previous year. Dr. Hamer states very graphically that the lessened death-rate from all causes, when compared with the average rate in the previous ten years, means a saving of 10,065 lives. It is satisfactory to learn that the infant mortality rate of 91 per 1,000 births was also lower than that of any previous year. The labors of official health visitors and of the many undertakings in the metropolis having for their object the saving of infant life are no doubt largely responsible for this desirable result. There is no doubt, moreover, that the mothers of the present day among all classes of society are learning the lesson of child rearing in a much more practical and thorough manner than it was taught to former generations."

Uncle Walt on the Early Fly.

The early fly's the one to swat. It comes before the weather's hot, and sits around and files its legs, and lays at least ten million eggs, and every egg will bring a fly to drive us crazy by and by. Oh, every fly that skips our swatters will have five million sons and daughters, and countless first and second cousins, and aunts and uncles, scores of dozens, and fifty-seven billion nieces; so knock the blamed thing all to pieces. And every niece and every aunt—unless we swat them so they can't—will lay enough dodgasted eggs to fill up ten five-gallon kegs, and all these eggs, ere summer hies, will bring forth twenty trillion flies. And thus it goes, an endless chain, so all our swatting is in vain unless we do that swatting soon, in Maytime and in early June. So, men and brothers, let us rise, gird up our loins and swat the flies! And sisters, leave your cozy bowers where you have wasted golden hours; with ardor in your souls and eyes, roll up your sleeves and swat the flies!—*Walt Mason*.

COMMUNICATIONS.

To the Editor,

DEAR SIR:—In the Mortality Statistics for 1912, recently published by the Bureau of the Census, appears on page 335 a statement of four deaths from tuberculosis of the lungs in infants less than one day old, and two deaths from the same cause in infants one day old. This statement is made from returns collected in the registration area.

Since one day of life only is too short a time for demonstration of tuberculosis by the inoculation test, diagnosis of tuberculosis in these six cases, and especially specific diagnosis of tuberculosis of the lungs, is but guesswork, in the absence of post-mortem examination. Physicians will understand the improbability of a necropsy having been done in even a majority of these six cases.

Correspondence with the Bureau of the Census develops the fact that there is no mention of post-mortem examination on the records used by the Bureau of the Census in compiling the statistics in question. "The compilation is made according to the statements received upon the transcripts, which are official copies of the original certificates on file in the state or city offices."

The Bureau of the Census is clearly not responsible for such undependable reports. It is continually endeavoring to increase accuracy in vital statistics. In the Physicians'

Pocket Reference to the International List of Causes of Death, published by the Bureau in 1913, appears on page 12 the advice, referring to the cause of death when indefinite, "If the physician is absolutely unable to satisfy himself in this respect, it is better for him to write Unknown than merely to guess at the cause."

Surely this concrete instance is sufficient evidence that the suggestion quoted from the Pocket Reference is entirely applicable.

I wish to thank Dr. Henry Koplik for suggestions made in corresponding upon this matter.

THEODORE C. MERRILL, M. D.

WASHINGTON, April 26.
1744 Columbia Road.

To the Editor,

DEAR SIR:—In my paper on "Vital Statistics in Some Municipal Reports," published in the February issue of the JOURNAL, I regret that an injustice was done to the city of Youngstown, Ohio. That city does not include stillbirths in its tables of deaths and makes a definite statement to that effect in connection with the tables published in its annual report.

Very truly yours,

CRESSY L. WILBUR.

WASHINGTON, April 13, 1914.

PERSONAL NOTES.

The following were elected to membership in the American Public Health Association May 1, 1914:

Thomas Franklin Abercrombie.

L. C. Allen, M. D.

William Allan Claxton.

Charles F. Dawson.

Leslie Carl Frank.

Henry Fauntleroy Harris, M. D.

Edward M. L'Engle, M. D.

L. B. McBrayer, M. D.

Eugene Edmund Murphey, M. D.

Henry Van Dyke Stewart.

Elmore C. Thrash.

Miss Jane Van DeVrede.

Miss Jessamine S. Whitney.

Alfred V. Wood.

Iva Catherine Youngmans, M. D.

Dr. Gustav F. Ruediger announces his resignation as director of the State Public Laboratories and Professor of bacteriology and pathology in the University of North Dakota to accept the position of director of the Hygienic Institute and health commissioner for La Salle, Peru and Oglesby, Ill., under an endowment by Hon. F. W. Matthiessen. His future address is La Salle, Ill.

CURRENT PUBLIC HEALTH LITERATURE.

AMERICAN.

American Journal of Diseases of Children, Chicago.

VII, No. 4. Apr.
Incubation Period. No. 1—Serum Disease. D. M. Cowie.

American Journal of Tropical Diseases and Preventive Medicine, New Orleans.

I, No. 9. Mar.
Epidemic of Paratyphoid Fever. A. N. Sinclair.
Growth of Filaria Embryos in Vitro. F. M. Johns and P. L. Querens.
Innocuous Bites of Malaria and Yellow Fever Mosquitoes During Daytime. E. Eccheverria.
Health Survey. W. H. Deaderick.

Archives of Ophthalmology, New Rochelle, N. Y.

XLII, No. 2. Mar.
Experiments on Cultivation of So-called Trachoma Bodies. H. Noguchi and M. Cohen.

Boston Medical and Surgical Journal.

CLXX, No. 15. Apr. 9.
Further Observations of Seasonal and Meteorologic Influence upon Tubercular Patients. N. R. Burns.

Bulletin of Johns Hopkins Hospital, Baltimore.

XXV, No. 277. Mar.
Brief History of Quarantine. W. W. Ford.
Tattoo Marks for Identification of Animals in Laboratories. J. A. Hunnicutt and A. P. Jones.

Engineering Record, New York.

LXIX, No. 15. Apr. 11.
Operating Results of Water-Purification Plant at Columbus.
Iron-Removal Plant at Urbana.
Refuse Collection and Disposal in Chicago.

LXIX, No. 16. Apr. 18.
Joint Commission's Remedies for Boundary Water Pollution.
Ottawa's Water Controversy.
Proposed System to Supply Water to Richmond, Cal.

Iowa State Medical Society Journal, Washington.

III, No. 9. Mar.
Public Health Work of Twenty-Seven Iowa Cities and Towns. M. F. Boyd.

Journal of Experimental Medicine, New York.

XXIX, No. 4. Apr.
Penetration of Virus of Poliomyelitis from Blood into Cerebro-Spinal Fluid. S. Flexner and H. L. Amoss.

Journal of Infectious Diseases, Chicago.

XIV, No. 2. Mar.
Pasteurization in Bottles and Process of Bottling Hot Pasteurized Milk. S. H. Ayers and W. T. Johnson.
Non-Cholera Vibrio Resembling True Cholera Vibrio and Pigment-Forming Vibrio. J. G. Drennen.
Disinfectant Action of Certain Bacterial Stains. A. M. Jansen.

Trachoma and Allied Conditions in New York School Children. A. W. Williams and others.
Absorption of Antitoxin and Agglutinin Injected Subcutaneously. W. H. Park, L. W. Famulener and E. J. Banzhaf.
Serum Sensitization and Dosage of Antitoxin. W. H. Park, L. W. Famulener and E. J. Banzhaf.
Protective Enzymes, Immune Sera and Anaphylaxis. R. M. Pearce and P. F. Williams.

Journal of the American Medical Association, Chicago.

LXII, No. 14. Apr. 4.
Methods of Examination of Illiterates for Mental Defectiveness. M. H. Foster.
Paratyphoid Fever with Report, Including Ex Post-Mortem Examination, of a Fatal Case of the "A" Type. Leverett Dale Bristol.
Some New Cameras for Laboratory Use. Louis B. Wilson.
The Tuberculosis Problem.—Continued.

LXII, No. 15. Apr. 11.
The Bacillus Aerogenes Capsulatus in Blood-Cultures, with Recoveries. Albert Howard Baugher.
Sporotrichosis of the Eye. Fred J. Fassett.
An Interesting Case of Chronic Lead Poisoning with Relapse Following Fresh Exposure. J. M. Anders.
The Tuberculosis Problem. Continued.

LXII, No. 16. Apr. 18.
A Simplification of the Gram Stain. Louis D. Smith.
The Tuberculosis Problem. Continued.

LXII, No. 17. Apr. 25.
The Tuberculosis Problem. Concluded.

New York State Journal of Medicine.

XIV, No. 3. Mar.
Certified Milk of Medical Society of County of Westchester. B. F. Drake.
Streptococcal Throat Disease. H. J. Ball.

Public Health Reports, Washington.

XXIX, No. 13. Mar. 27.
Quinine Prophylaxis for Malaria. H. R. Carter.
Car Sanitation. Cleansing and Disinfection of Railroad Coaches. A. D. Foster.
Blindness in Cebu. Louis Schwartz.

XXIX, No. 14. Apr. 3.
The Notifiable Diseases. Their Prevalence in Cities During 1912.
The Infectious Diseases, Recent Additions to Our Knowledge of their Etiology. John F. Anderson.

XXIX, No. 15. Apr. 10.
Malarial Fevers in the United States. R. H. von Ezdorf.
The Pollution of Tidal Waters. Hugh S. Cumming.

XXIX, No. 16. Apr. 17.
Typhus Fever.
Ship Rats and Plague.
Screening as an Anti-Malarial Measure. H. R. Carter.
Endemic Gout. Its Possible Relationship to Water Supply. Taliaferro Clark and Claude C. Pierce.
Treatment of Rabies. Report of a Case Treated Unsuccessfully with Quinine. C. L. Williams.

FOREIGN

Arbeiten aus dem Kaiserlichen Gesundheitsamte.

XLVII, Bd. 1 Heft. Jan.

The Destruction of Anthrax Spores on Skins and Hides by Solutions of Common Salt and Hydrochloric Acid. E. Hailer.
Studies on Formaldehyde: The Formaldehyde Gas and its Polymers. F. Auerbach.

Beitrage zur Klinik der Tuberkulose, Wurzburg.

XXXI.

Study of Tuberculosis Death Rates. K. Dorner.

Berliner Klinische Wochenschrift.

LI, No. 9. Mar. 2.

Experimental Research on Smallpox Virus. H. A. Gins.
Tubercle Bacilli in the Blood Stream. F. Klempner.

British Medical Journal, London.

No. 2776. Mar. 14.

Hygienic Aspect of Coal Mining Industry in United Kingdom.—Continued. A. F. Shufflebotham.

No. 2777. Mar. 21.

Hygienic Aspect of Coal Mining Industry in United Kingdom.—Continued. A. F. Shufflebotham.

No. 2778. Mar. 28.

Hygienic Aspect of Coal Mining Industry in United Kingdom.—Continued.

Bulletin de L'Academie de Medecine, Paris.

LXXVIII, No. 10. Mar. 10.

Typhoid Epidemic at Avignon; 673 Cases in Twenty-Five Days.

Deutsche Medizinische Wochenschrift, Berlin.

XL, No. 10. Mar. 5.

Bile in Culture Medium. E. Busing.
Tubercle Bacilli in the Blood. C. Moewes and E. Rautenberg.
Paratyphoid Epidemic Traced to Flour. H. Langer and Thoman.

XL, No. 11. Mar. 12.

Immunization Against Anthrax. E. Wernick.
Diphtheria Antitoxin in Bacilli Carriers, etc. R. Otto.
Danger and Prophylaxis of Anaphylaxis from Diphtheria Antitoxin. K. Joseph.

Journal of the Royal Sanitary Institute, London.

XXXV, No. 3. Apr.

The Progress of School Hygiene. James Kerr.
The Housing Problem of Swansea. A. D. Jenkins and E. E. Morgan.
Open Air Education. Thomas Evans.
The Mechanical Filtration of Moorland Water Supplies and the Action of Water on Lead. A. S. Delépine.

Lancet, London.

No. 4723. Mar. 7.

Morbid Anatomy of Tuberculosis in Man. T. Shennan.

No. 4724. Mar. 14.

Agglutination of M. Melitensis by Normal Cow's Milk. P. W. Bassett-Smith.

No. 4725. Mar. 21.

Etiology of Endemic Cretinism, Congenital Goitre and Congenital Parathyroid Disease. R. McCarrison.

Medical Officer, London.

XI, No. 14. Apr. 4.

House Flies and Disease. Edward Halford Ross.

XI, No. 15. Apr. 11.

Tuberculosis in Hampshire Schools. J. C. Hoyle, J. Teare and E. A. F. Wilkes.

Medizinische Klinik, Berlin.

X, No. 10. Mar. 8.

Modification of Pasteur Treatment of Rabies. O. Bujwid.
Experimental Syphilis in the Rabbit and Laboratory Infection of Two Attendants. F. Graetz and E. Delbanco.

Proceedings of the Royal Society of Medicine: Section of Epidemiology.

VII, No. 5. Mar.

Malaria in Cyprus and Greece. Sir Ronald Ross.

Public Health, London.

XXVII, No. 6. Mar.

The Use of Refrigeration in the Preservation of Foods. William Hanna.
The Laboratory Diagnosis of Pulmonary Tuberculosis. S. R. Gloyne.

XXVII, No. 7. Apr.

Notes on an Outbreak of Enteric Fever in Newcastle-on-Tyne. S. J. Clegg.
Woman's Work in Public Health. A. B. Hill.

Surveyor, London.

XLV, No. 1. Mar. 20.

The Present Position of the Sewage Disposal Problem. Gilbert Fowler.

XLV, No. 1. Apr. 3.

Chemical Oxidation as a Process of Sewage Treatment.

Therapie der Gegenwart, Berlin.

LV, No. 3. Mar.

Active Immunization Against Diphtheria. E. Schriber.

Wiener Klinische Wochenschrift.

XXVII, No. 5. Jan. 29.

Housing Reforms. E. Hofmarkel.

Zeitschrift fur Hygiene und Infektionskrankheiten.

67 Bd. 1 Heft.

Disinfection of Dwellings in Tuberculosis. K. Laubenheimer.
Epidemiological Investigations on the Question of Phthisiogenesis. Hillenberg.

AMERICAN JOURNAL OF PUBLIC HEALTH

LEAD POISONING IN THE UNITED STATES.

ALICE HAMILTON, M. D., M. A.,

Chicago.

Only a few years ago, we were most of us under the impression that our country was practically free from occupational poisoning, that American match factories never were troubled by cases of phossy jaw, and that our lead works were so much better built and managed, our lead workers so much better paid, and therefore better fed, than the European, that lead poisoning was not a problem here as it is in all other countries.

The investigation made by John Andrews for the United States Bureau of Labor disillusioned us about our freedom from phosphorus necrosis, and the studies published by the New York State Factory Investigating Commission and by the United States Bureau of Labor Statistics are teaching us that, far from being superior to Europe in the matter of industrial plumbism, we have a higher rate in many of the lead industries than have England and Germany. As a matter of fact, the supposed advantages of the American lead worker, good wages, short hours, a high standard of living, obtain only in a few of the lead trades, such as house painting, plumbing (hardly a lead trade now), printing, and white ware pottery work. Art potteries, tile factories, white and red lead works, storage battery plants, and lead smelters and refineries pay the rate of wages given to unskilled laborers in that particular section and the work day is ten hours, while the standard of living is often very low, the men employed being for the most part foreigners with no permanent relation to the community in which they are working. When to these factors are added the almost universal absence of sanitary control of the work places and of personal care of the working force, it is easy to understand why we have much lead poisoning in industries which in Great Britain and Germany are comparatively safe.

It is not so easy to understand why we have so long been in ignorance

on the subject, why American physicians and sanitarians, to whom all other questions of preventable disease are matters of the greatest interest, should for so long have neglected industrial plumbism, which their colleagues on the other side of the water had so effectively controlled. After all, it is a question for the public health men to solve, and, no matter what protective laws are passed by legislatures, we shall never really reform our lead trades until the sanitarians of the country grapple with the subject.

It will not take long to give a sketch of what we know about lead poisoning in the United States. The first published report was that of the Occupational Diseases Commission of Illinois. In 1911, 578 cases of lead poisoning were found to have occurred in the three preceding years, in Illinois, 308 of them in the last year and most of them in Chicago. About seventy different industrial processes had given rise to these cases.

Dr. John Andrews' analysis of 60 fatal cases of industrial plumbism in New York State was the next publication, appearing in Bull. 95 of the Bureau of Labor. This throws light on many occupations not ordinarily associated in the minds of physicians with the danger of lead poisoning.

Then the state of New York took up the study of this disease and so far, two reports have been published by the Factory Investigating Commission, the first under the management of E. E. Pratt, confined to New York City, and the second taking in all the state and conducted by Graham-Rogers and John H. Vogt. Doctor Pratt made an intensive study of several industries in New York, notably the white and red lead trade, the making of paints and colors, and the use of lead as a tempering agent. He found easily 121 cases of lead poisoning in this city in 1911, including only those that were relatively serious. Doctor Graham-Rogers' report covers practically every lead industry in the state, some of which, as the making of storage batteries, pottery work, the making of rubber, are described in full detail. The analyses of air made by Mr. Vogt show a state of contamination truly startling in certain industries. Thus in the mixing of materials in a rubber factory, as much as 8.0 mg. of lead were found in a cubic meter of air. As an adult breathes about 4.5 cm. in the course of ten hours, it follows that a workman here might inhale 36.0 mg. during his day's work. Legge* says that 0.5 mg. in a cubic meter is the limit of safety, and Teleky† says that a daily dose of 10 mg. may lead to severe symptoms in a few weeks. Other places in which these investigators found gross contamination of the air were near lead pots of solder or babbitt, where 5.0 mg. and 3.6 mg. and 2.6. mg. per cubic meter were found. In a storage battery factory they found in the pasting room 4.6 mg. and in the lead-burning room, 2.6 mg.

The lead industries which have been studied intensively by the Federal

*Legge, Ann. Rep. Chief Insp. Fact. and Workshops for 1912.

†Teleky, Protokoll d. Sitzung d. gross. Rats d. Inst. f. Gewerbehyg., 1912.

Bureau of Labor* are the making of white and red lead, the glazing of pottery and tiles, the enamelling of sanitary ware, the painters' trade, the smelting and refining of lead and the making of storage batteries. The white lead industry in the United States is more dangerous than in England or Germany, because we use dry methods where they use wet, and therefore have a more serious dust problem. Owing partly to the evident risks, this industry has of late undergone great reforms, and in the majority of our plants there is a constant and intelligent effort to protect the men. The same thing is true of all but a few of the red lead factories.

Glazing of pottery and, to a slighter extent, decorating it, is one of our bad lead industries and yet not enough attention has been attracted to it to bring about the needed reforms. Fortunately, both New Jersey and Ohio, the two chief pottery states, are now concerning themselves seriously with industrial plumbism and the dangerous conditions in the potteries will probably soon disappear. This is the only lead trade studied by the Bureau in which women are employed.

Even more fraught with danger is the porcelain enamelling of sanitary ware, bath tubs, sinks, etc. The red hot ware from the furnaces must be thickly dusted over with a ground glass containing soluble lead in proportions of 0.5 per cent. to 20.0 per cent. During the process, the air is cloudy with this dust, and enamellers suffer not only from tuberculosis but from acute and often severe lead poisoning. At the time the investigation was made, 1912, there were practically no provisions for cleanliness in these factories nor for dust prevention.

The painters' trade is regarded in all countries as the most difficult of all the lead trades to control, because it is carried on under such varying conditions. In factories, the same control can be exerted over painters as over the other workmen, but much of the painters' work is done outside factories. In the United States, the branches of the painters' trade in which the danger from lead is greatest are the painting of carriages, especially the wheels, interior house painting, ship painting and the painting of interiors of railway cars. This is because in all these branches much white lead is used and is sandpapered, producing lead dust, the worst feature in the painters' trade. Comparatively safe branches are the painting of agricultural machinery, wagons, automobile bodies, the exterior of freight cars, all of which are now usually painted by dipping or spraying and often with leadless paint.

The United States is a great lead-producing country and the smelting and refining plants visited in the course of the Government investigation employ some 7,500 men. Dust and fumes are the great dangers here, the provision of wash rooms and baths is not nearly as important as it is in such industries as white and red lead where the men are smeared over

*Bulletins 95, 104, 120, 140.

with soluble salts. In lead smelting, it is the fine dust and the volatilized oxides which give rise to poisoning. Our smelting industry does, to a certain extent, try to protect the workers from poisoning but though there are very few really shockingly bad plants, there are none that can be called admirable.

Storage batteries are assemblages of lead grates with a paste of lead oxides rubbed into the interstices. The workers are exposed to lead fumes in casting and in joining the plates together, and to lead oxide dust in making and applying the paste. It is in all countries regarded as one of the worst of the lead trades, and is hedged about with all sorts of restrictions. In the United States it has only very lately attracted any attention at all, and the conditions under which the work is done in our factories are conducive of a very high rate of poisoning.

Many of the establishments in which these manufacturing processes are carried on employ physicians to take care not only of accidental injuries but of sickness, especially lead poisoning. The opportunity which these men have of controlling the sanitary conditions in the plant is sometimes very well used. I have found company physicians acting as sanitary experts, going through the plant with the superintendent and working out with him the problem of dust or fume prevention. Such physicians keep records of their cases and are able to see which department is sending in an undue share and needs clearing up. Unfortunately, this kind of physician is in the minority. Much more common is the man who stays in his office and lets the men come to him, who knows little or nothing of the conditions under which they work and is impressed with the idea that lead poisoning is chiefly caused by the men's own ignorance and carelessness. I have had many such doctors tell me seriously that it is the lead that gets under the finger nails which does the harm, and this while the men they were discussing were working in an atmosphere foggy with lead dust or fumes. I have had others tell me that the men will always suffer from lead poisoning as long as they refuse to wash before eating their lunch, and all the time I knew that the plants which employed these physicians had given the men no place to wash and no time to go home at noon and get clean. But they continue to preach cleanliness without ever troubling to find out if their advice can possibly be obeyed.

There is here a great neglected field in American medicine and one of growing importance, for each year the number of industrial establishments which employ physicians increases, and the opportunity for expert hygienic control of our dangerous trades increases. But there will have to be a more general understanding of the problems of industrial hygiene before the service rendered by the majority of company physicians becomes of much real value.

INDUSTRIAL HYGIENE. A NEGLECTED FIELD OF PUBLIC HEALTH WORK.

C. T. GRAHAM-ROGERS, M. D.,

Chief Medical Inspector of Factories, New York State Labor Department.

Read before the General Sessions of the American Public Health Association, Colorado Springs, September, 1913.

To tell you of the need for more workers in the field of, and more attention being given to, the subject of industrial hygiene, would consume the afternoon; to condense it into the time allotted me is impossible without omitting much of importance, so I shall be very brief, and merely endeavor to awaken you to the necessity of giving the subject attention.

It is a well-known truth that the strength of a nation is dependent upon the health of its people. Statistics indicate that the major portion of the nation is engaged in industrial employment, so, from an economic standpoint, the question of industrial hygiene is of importance not only to the workers and manufacturers, but also to the state, for upon the state falls the burden of paying for the results of faulty hygiene.

The safeguarding of the public health is an important matter, as has been demonstrated through the formation and activities of the American Public Health Association. Special attention has been given to the subject of prevention of disease, especially communicable diseases; and to the removal or betterment of conditions influencing general diseases; unfortunately, industrial hygiene, and some of the factors relating not only to industrial hygiene but to hygiene in general, have been inadvertently neglected. To keep the body healthy, clean food is required, and the principal foods are air, water and sunlight, for without these we would be unable to secure the food stuffs necessary for consumption.

It is true that we may live without sunshine for a long time, but it is recorded that in the Middle Ages, a favorite method of taking life without resorting to actual murder was by incarceration in gloomy dungeons.

We have instances of people fasting, or doing without foodstuffs for many days, and of cases where lack of water has been endured for several days, but in no instance has it been recorded that anyone has survived after deprivation of air for many minutes.

The subject of food adulteration is receiving marked attention, and as a result we have drastic pure food laws. The water supply is guarded by the health authorities, physicians and general public. In 1909 it was my pleasure to read a paper before this learned Association, in which a

plea was made for assistance in securing better air conditions, and it is gratifying to note the attention now being given to this subject.

Deficient light is an inexcusable sanitary defect. Notwithstanding this fact, and the fact that sunlight is not only an important factor in relation to the question of ventilation and industrial accidents, but also to the question of disease, the subject of proper lighting is not receiving the attention proportionate to its importance.

Industrial hygiene is not concerned merely with the health of the worker, but also with the safety of the worker, for unhygienic surroundings have much to do with the cause of minor accidents. Pure air and good lighting are of the utmost importance.

Some years ago I used the term mechanical hypnotism, giving this as a contributing cause for many minor accidents occurring. Take, for example, an industry where there are large automatic machines, such as looms or stamping machines or presses. The workers, usually young persons and not overwell nourished, are at work in the midst of a constant clattering, with a bright or glaring light in front of the eyes to illuminate the work (necessary because the machinery and accumulated stock decrease the natural lighting), and ventilation dependent upon natural means, with the result of having to breathe stagnant vitiated air. After a short time the worker becomes a part of the steady monotonous rhythm going on; then something happens to the machine which disturbs its rhythm, the worker, still influenced by the general rhythm, reaches into the machine automatically and recovers the normal poise only after being injured.

Does not this emphasize the need of attention being given to remedying such conditions? But so long as we neglect to study industrial hygiene, and do not insist upon improvements, just so long will we have maimed bodies among the workers.

Many of the foreign countries have given the subject of industrial hygiene marked attention, but in this country we are slow in awaking. For a number of years Dr. Frederick L. Hoffman has been calling attention to the subject, and the American Association for Labor Legislation has been fighting for improved conditions under which workers are employed, but the sanitarians are silent.

In 1907, New York State was the first one in this country to have medical inspection of factories directly connected with the Labor Department, but it was not until 1912, after a Legislative Commission had conditions brought forcibly to their attention through personal visits to plants and factories, that laws were enacted to enable the Labor Department to properly enforce the rules of industrial hygiene.

It was not until 1911, after an Occupational Disease Commission had been appointed and reported their findings, that the State of Illinois pro-

vided for medical inspection in connection with the Bureau of Factory Inspection. And it is only this year (1913) that Massachusetts, the state we formerly looked to for inspiration in health problems, has patterned after New York, and, within the past few months, Pennsylvania has joined the ranks.

In our discussions upon public health topics, attention is centered upon questions concerning our general conditions of living. Why should not the same safeguards be granted to the workers during their hours of labor, as of leisure and sleep, considering the fact that the worker spends at least one third of the time at labor.

Industrial employment, especially where the worker is subjected to monotony, deprivation of open air life, and loss of opportunity for proper social entertainment, with the opportunities of poor sanitation, exposure to dust and vitiated air, is not as conducive to good health as life in the outdoor air, and becomes a factor in causing degeneracy and illiteracy.

An episcopal bishop once preached, that a healthy body means a clean mind, and a clean mind means clean morals. This merely emphasizes the old adage that cleanliness is next to godliness, and since Sir John Simon said that cleanliness is the basis of all sanitation, let us preach and practice industrial hygiene as a means of securing better morality.

The subject of industrial hygiene is given but scant or no attention at all in our medical schools, and this, notwithstanding the fact that the general practitioner derives his income mainly from the workers. In but few of the engineering or technical schools is the subject considered at all.

A short time ago the matter was presented quite forcibly in a civil prosecution brought by the department against a large firm engaged in manufacturing household utensils. A member of the teaching staff of one of the largest medical schools in New York City appeared as an expert for the company, and testified that it was not deleterious to the health of the workers to be exposed all day in an atmosphere containing sulfuric acid, and that mechanical means for ventilation was not necessary; then frankly admitted he had never read any of the authorities on industrial hygiene or occupational diseases, or had even given the subject much thought, and concluded by deriding the action of public health officials. Is it small wonder then, that manufacturers hesitate to improve conditions, and that workers decline to make use of safeguards for their health?

I again make a plea for the sanitary engineers to give more attention to the subject, that we may have definite standards, and greater uniformity in dealing with ventilation problems. Give it but half the attention that has been given to water pollution and sewage disposal, and the results will be surprising, for, after all, air is the most essential food of all.

The architects must be made to realize that the engineer's plan must not be ignored, and that the physicians must be consulted. Neither art, beauty, nor even commercial convenience should be made paramount to the health of the individual.

Securing and compilation of vital statistics is held up as a means for securing improved hygienic conditions. Why wait until the subject has passed beyond help? why not concentrate on morbidity statistics, ascertaining the cause, and removing or remedying the danger? Such is the procedure followed by the New York State Labor Department, which requires the reporting of occupational poisonings and diseases.

It is not so long ago that bad air was blamed for most general diseases. It required intensive research work to discover the real cause, which in many cases was found to be a specific one, and so a foundation was laid for preventive medicine. Today, the industries bear the burden of being responsible for many diseases, merely through the lack of intensive research work in industrial hygiene.

It is true that the subject of plumbism has been given marked attention, and the danger of phossy jaw is being eliminated, but this was only after intensive studies and analytical research. There still remains many intoxications and diseases worthy of our attention and requiring intensive investigation, so that we may apply the remedy to either prevent them entirely, or safeguard the worker while exposed to the dangers.

The children of today are the nation of tomorrow, and yet, here is a factor in industrial hygiene sadly neglected.

We have our medical school inspection, and our hygiene of the school and childhood, but just as soon as the child steps out into the industries they are lost. We aim to make strong men and women, and yet, when we are most needed we desert. What little work has been done shows the necessity of a closer study of industrial hygiene to protect the young workers. It must be remembered that infant mortality is influenced by our application of the rules of industrial hygiene. If we expect a healthy nation, we must see to it that the parents, and especially the mothers, are healthy; for, in many instances, the industry, processes of manufacture and product manufactured, bear indirectly upon the health or life of the child. Hence the need of paying some attention to the hygiene of the industry, as well as to the home and person.

I shall not attempt to go into the details of the special dangers to health in the various industries, for the subject is unending. However, there is no industry now considered dangerous, but with proper application of the rules of industrial hygiene may be made safe.

It is true that many large industrial concerns have awakened to the importance of industrial hygiene and have medical officers, but you may rest assured that this was not instituted because of any great philanthropic

or humanitarian reason, but because of the distinct financial gain resulting, proving that the application of rules of industrial hygiene is of economic importance. Again, it may be that the enactment of workmen's compensation laws has much to do with the sudden activity. We have but to read the reports of Prof. C.-E. A. Winslow, a prominent worker in the field of industrial hygiene, in order to realize the economic saving secured through the application of proper industrial hygiene.

But we must not devote our energies upon the plant and proprietors alone. The workers must aid and must be made to understand that, from a health standpoint, he is the ward of the state, and that, even if he does not value his own health, nothing must be done to endanger the health of fellow-workers.

It is only by educational means that results may be accomplished. Only by the subject being taken up and discussed and awakening public opinion will we obtain greater results, and not more laws, but better compliance with present laws. Our aim is conservation of human life. It is a progressive age. Our theme prevention, not cure, then let us practice as we preach, and not tomorrow, but today.

Tomorrow is that lamp upon the marsh, which a traveler never reacheth.

Tomorrow, the rainbow cup, coveteth prize of ignorance.

Tomorrow, the shifting anchorage, the dangerous trust of mariners,

Tomorrow, the wreckers' beacon, the wily snare of the destroyer.

THE BACTERIOLOGICAL STANDARDIZATION OF DISINFECTANTS.

SOME FURTHER SUGGESTIONS.

H. C. HAMILTON and TATSUZO OHNO.

From the Research Laboratory of Parke Davis & Co., Detroit, Mich.

Read before the Laboratory Section, American Public Health Association, Colorado Springs, September 1913.

When any substance which finds application directly or indirectly in therapeutic measures cannot readily be standardized by any chemical method, other methods are usually attempted by which to determine its value. The medicinal substances which fail to respond to any chemical assay method are standardized by various means, of which perhaps the most important is the biological assay.

An example of valuable products whose values cannot, in most cases, be determined by chemical assay is that of the coal-tar disinfectants. While it is established that the value of the coal-tar oils as disinfectants resides largely if not entirely in those constituents similar to phenol, the crude product contains these phenols in such an endless variety that the chemical assay of any oil can give only a hint as to the actual value of that oil as a germicide. We resort, therefore, to a bacteriologic method and attempt to decide its value by testing it as a germicide.

It is almost impossible to make a laboratory test of a disinfectant which will duplicate the practical use of that product even in one particular case. How much more difficult it would be to duplicate every use to which such a product may be applied, is very evident. The infinite variety of conditions under which disinfection is practised opens wide the field for discussion as to the minor points which it is desirable to consider in outlining a method for their standardization.

This is but natural. One investigator, realizing the difference in resistance of different organisms, chooses an exceptionally resistant one, as *B. pyocyaneus*. Another, who is vitally interested in the disinfection of excreta, suggests *B. typhosus*. Another, wishing to avoid the danger lurking in a culture of *B. typhosus*, chooses *B. coli communis*.

Again, one investigator considers that a disinfectant should be valued on its prompt action and suggests that the dilution to be compared with standard should be that which kills the organism in a time between one and five minutes. Another suggests a half-hour as the maximum time, on the logical supposition that the disinfectant will be acting for at least

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that period. So, too, opinions vary as to the temperature at which disinfectants should be tested and as to the medium in which the organism should be grown. While these points are not unimportant, any method which attempts to incorporate all of the possible suggestions would necessarily be too cumbersome for practical use.

Looking over the field of discussion, it is evident that one may eliminate as less important all methods but two; namely, that proposed by Doctor Samuel Rideal and T. Ainslie Walker and that proposed by Doctors John F. Anderson and Thomas B. McClintic, known, respectively, as the Rideal-Walker and Hygienic Laboratory Methods. The others may be eliminated from any specific reference because so many of their valuable features have been incorporated in these two methods.

The authors of this paper published a method (AMERICAN JOURNAL OF PUBLIC HEALTH, May, 1912), which has been in practical use for the standardization of commercial disinfectants for a period of fourteen years. In its essential details, the Rideal-Walker Method resembles it so closely that for all practical purposes they are the same.

In a later paper (AMERICAN JOURNAL OF PUBLIC HEALTH, June, 1913), the authors suggested some changes in following the Hygienic Laboratory Method, changes which appear to simplify what is really a complicated process. In that paper reference was made to the possibility of evolving from the wealth of material at hand a simple practical method for standardizing disinfectants.

At this time we wish to present some data pointing to the marked variation in the results of germicidal assays by the Hygienic Laboratory Method. This data consists of: first, reports of tests of two disinfectants which had been submitted to three bacteriologic laboratories; second, the reported coefficients on several well-known disinfectants by various investigators; third, results obtained by using, as the test organism, two different strains of *B. typhosus* grown in the same culture medium; fourth, results of a long series of tests on two disinfectants under a variety of conditions, including the use of test organisms (*B. typhosus*, Hopkins) obtained from different sources and from the same source at different times; also the growing of the organism on or in different media.

As a conclusion to these illustrations, we wish to suggest certain steps which might be adopted to advantage as a means of obtaining uniform results in standardizing disinfectants.

When the Hygienic Laboratory Method was made public by the appearance of *Bulletin No. 82*, the authors of this paper immediately set about becoming familiar with the technique, with the idea that the method would soon become official. Such variable results were obtained, however, that it was decided to submit two samples to three prominent bacteriologists.

The remarks of these bacteriologists quoted in the letters below are sufficient to indicate that the method is one which leaves much to be desired. From letter dated January 28, 1914, signed by Dr. Herbert D. Pease, we excerpt the following:

"I believe now that it is, or will very soon be possible to obtain results with the Hygienic Laboratory Phenol Coefficiency Method which would be within 10 per cent. or 15 per cent. of each other. What I stated in my letter held good at that time, but I do not think it holds true in all respects at the present time. We are making a critical analysis of our methods at the present time and I expect to have them very greatly improved in the near future.

"Some of the points that I brought out in my letter of February 19 are still expressive of my opinion. The last sentence of the first paragraph, 'The variations in results are always greater the higher the coefficients, and are smaller the lower the coefficients.' I think even the percentage variation is slightly greater with the higher coefficients than with the lower.

"I do not believe we have yet learned all there is to know about the Hygienic Laboratory Method. It is quite possible that we can improve it, although I do not see very clearly at the present time just wherein any changes would produce such a result. I believe we should all keep working at the matter as far as we possibly can—I intend to try to do my part."

$$\text{Hygienic Laboratory Phenol Coefficient No. 578273} \left\{ \begin{array}{l} \frac{27.5}{80} = 343 \\ \frac{40.0}{110} = 363 \end{array} \right\} = 3.53.$$

$$\text{Hygienic Laboratory Phenol Coefficient No. 581507} \left\{ \begin{array}{l} \frac{27.5}{80} = 3.43 \\ \frac{37.5}{110} = 357 \end{array} \right\} = 3.59.$$

(signed) H. D. PEASE.

The letter of Dr. Joseph McFarland we quote in full as follows:

PHILADELPHIA, January 14, 1913.

We have at last completed the tests of Kreso 1 (Rx 578275) and Kreso 2 (Rx 581507). It was a long and tedious piece of work, fraught with many difficulties, and complicated by the rapidity of transplantation necessitated by the method worked out by Anderson.

The culture employed for the tests was the "Hopkins Typhoid Bacillus" obtained from Dr. Anderson. The carbolic acid used was Merck's "Absolute." We at first worked with a stock solution made by weighing out both the carbolic acid and the water, but subsequently abandoned this for a new stock solution made by measuring the water and weighing the carbolic acid. As you may note by an examination of the protocols, it is the latter solution that coincides with the solution used by Anderson.

You will see that the results obtained at the different tests were not uniform. To secure, as nearly as possible the precise strength of the Kreso solution, we made many tests of both and averaged them. We think that their averages give the strength as nearly as it can be determined, Kreso-1=4.58, Kreso-2=5.18.

We hope that these results are in agreement with your own.

Very truly yours,

(Signed) JOSEPH MCFARLAND.

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Dr. Webster's letter including report is as follows:

We enclose you herewith report for examinations of Kreso Nos. 581507 and 578273. The phenol coefficient of this disinfectant was determined according to the method of *Bulletin No. 82*, Hygienic Laboratory, Public Health and Marine Hospital Service of the United States.

The delay in getting the report to you was occasioned by the fact that it was necessary to run three different series of tests before we could be sure of the test typhoid organism.

Trusting that this report may be satisfactory to you and thanking you for your favor, we remain.

Very truly yours,

CHICAGO LABORATORY.

(Signed) R. W. WEBSTER, per L.

$$\text{Kreso No. 578273 } \frac{\frac{4.00}{8.0} + \frac{5.00}{11.0}}{2} = \frac{5 + 4.54}{2} = 4.77.$$

$$\text{Kreso No. 581507 } \frac{\frac{3.00}{8.0} + \frac{4.50}{12.0}}{2} = \frac{3.75 + 3.75}{2} = 3.75.$$

TABLE I.
REPORTS SUMMARIZED.

Tested by.	Disinfectant.		Date of Tests.
	578273.	581507.	
	Coefficient.		
Dr. Herbert D. Pease.....	3.53	3.59	Oct., 1912.
Dr. Joseph McFarland.....	4.58	5.18	
Dr. R. W. Webster.....	4.77	3.75	
Tatsuzo Ohno.....	5.45	4.95	
H. C. Hamilton.....	4.75	4.3	
Average of the five results.....	4.61	4.35	
Results on different dates.			
Ohno.....	7.1	7.9	July
	4.88	4.53	Oct.
	5.67	5.	Oct.
Hamilton.....	6.	5.	June
	4.75	3.6	Oct.
	5.	4.1	Oct.

That the Hygienic Laboratory Method often gives different results in the hands of different workers, is also evident from the following results compiled from different sources:

TABLE II.

Disinfectant.	Authority.	Result.
F	Hamilton	3.9
	Ohno	4.
	Hygienic Laboratory Bull. 82	6.06
	Label	6.
G	Hamilton	9.2
	Ohno	9.4
	Hygienic Laboratory Bull. 82	15.
	Label	15-16
H	Hamilton	9.
	Ohno	10.
	Pearson	22½
	Hygienic Laboratory	16.6
	Texas State Board of Health	18.
	Dr. Prescott	12.2
	Walker	22

(American Medicine, May, 1912)

The above instances are sufficient to make one doubt the correctness of any of the tests. It should be noted that the authors' results were in every case obtained by testing the same sample and by using the Hopkins' organism, coming either directly or indirectly from the Hygienic Laboratory, and grown for one week in bouillon according to the method described in *Bulletin No. 82* of the Hygienic Laboratory.

These instances show, too, that phenol alone cannot be depended upon as a safe control. If it were a reliable standard, the coefficient would not vary, since different conditions would affect standard and sample equally. Cultures of *B. typhosus* seem to acquire an increased resistance towards the coal-tar disinfectants, while remaining unchanged toward phenol. If not, why should we obtain results like in Table III.

It is possible that the character of the emulsifying agent in this case (gelatine) may have influenced the results obtained.

These tests were made about a week to ten days after receiving a fresh agar culture of the test organism from the Hygienic Laboratory.

The Hygienic Laboratory Method has invariably given a lower value to a coal-tar disinfectant than one obtainable by the other methods cited. The question, therefore, arose, what feature of the tests is responsible for this lower value. By planting culture No. 0190 in the medium used in the Hygienic Laboratory Method, it was at once found that the

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test organisms are decidedly different in resistance, the Hopkins' strain being considerably stronger toward the coal-tar disinfectants than the strain previously employed (No. 0190. See Table IV). The Hopkins' strain, however, as is shown in Table I, had at one time not much greater resistance than culture No. 0190.

TABLE III.
GERMICIDAL ASSAY—HYGIENIC LABORATORY METHOD.
Test of Disinfectant, K.

Sample.							Phenol.						
Dilutions.													
April 10, 1912.													
1600	—	—	—	—	—	—	90	—	—	—	—	—	—
1800	—	—	—	—	—	—	100	+	—	—	—	—	—
2000	+	—	—	—	—	—	110	+	+	—	—	—	—
2200	+	+	+	—	—	—	120	+	+	+	+	—	—
2400	+	+	+	+	+	+	130	+	+	+	+	+	+
April 11, 1912.													
1900	—	—	—	—	—	—	90	—	—	—	—	—	—
2000	+	—	—	—	—	—	100	+	—	—	—	—	—
2100	+	+	—	—	—	—	110	+	—	+	—	—	—
2200	+	+	+	—	—	—	120	+	+	+	+	—	—
2300	+	+	+	+	+	—	130	+	+	+	+	+	+
Coefficient 20.													
Sept. 9, 1912.													
1200	+	+	+	+	+	+	90	—	—	—	—	—	—
1300	+						100	+	—	—	—	—	—
1400	+	all					110	+	+	+	+	—	—
1500	+	growth					120	+	+	+	+	+	—
1600	+						130	+	+	+	+	+	+
Sept. 10, 1912.													
800	—	—	—	—	—	—	90	—	—	—	—	—	—
900	+	—	—	—	—	—	100	+	—	—	—	—	—
1000	+	+	+	—	—	—	110	+	+	+	—	—	—
1100	+	+	+	+	+	—	120	+	+	+	+	—	—
1200	+	+	+	+	+	+	130	+	+	+	+	+	+
Coefficient 9.													

To determine whether the method of growing the organism has any appreciable effect on its resistance, a long series of tests was devised and carried out by the authors working independently. The experiment included the test of three disinfectants on the Hopkins' organism, three different cultures, lettered a, b, and c, being obtained at different times and grown in three ways, namely;

x continuously on bouillon,
y " " agar,
z alternately on agar and bouillon.

TABLE IV.
HYGIENIC LABORATORY METHOD.

Min.	Phenol.				D.				E.			
					Hopkins' Culture.							
2½	-	+			-	+			-	+		
	90	100	110	120	14	15	18	19	8	9	11	12*
15			-	+			-	+			-	+
	Coefficient				A 15.9				B 9.5			

					Culture No. 0190.							
2½	-	+			-	+			-	+		
	100	110	120	130	16	17	22	23	10	11	13	14*
15			-	+			-	+			-	+
	Coefficient				A 17.2				B 104.			

* Dilutions of D and E are in hundreds.

The first (x) was transplanted daily from bouillon to bouillon. The second (y) was transplanted weekly from agar to agar, a bouillon culture being made every other week and transplanted to bouillon daily. The third (z) was transplanted from bouillon to agar, where it grew one week, then transplanted to bouillon from this medium, transplants being made daily for one week, then to agar again for one week.

The results of seventeen tests covering a period of eight and one-half months is summarized in the following tables:

TABLE V.

Average for each culture grown under each of the three different conditions:

B.		C.	
ax	4.56	ax	9.38
ay	3.45	ay	9.30
az	4.24	az	8.91
bx	4.37	bx	9.12
by	4.28	by	9.43
bz	4.28	bz	9.24
cx	4.75	cx	9.24
cy	3.82	cy	8.81
cz	4.21	cz	9.03

Averages when culture is grown and transplanted differently:

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x	4.58	x̄	9.25
y	4.11	y	9.18
z	4.24	z	9.4
Averages with the different cultures:			
a	4.38	a	9.20
b	4.31	b	9.25
c	4.26	c	9.03

The averages shown in these tables are remarkably close, considering what variable results this method of testing has given on other occasions. But when one observes the extremes, the variable results obtained are more apparent.

The following tables show the lowest and highest coefficients obtained with each culture and each way of growing the culture, and shows also the difference between the extremes and the percentage this difference is, of the lowest coefficient.

TABLE VI.
DISINFECTANT B—EXTREME COEFFICIENTS.

	Lowest.	Highest.	Difference.	Per Cent.
ax.....	4.	5.5	1.5	37½
ay.....	3.68	4.9	1.22	33
az.....	3.48	4.92	1.44	41
bx.....	3.88	5.5	1.62	42
by.....	3.8	4.72	.92	24
bz.....	3.48	4.77	1.29	37
cx.....	4.1	5.7	1.6	40
cy.....	3.	4.77	1.77	59
cz.....	3.6	5.	1.4	41

DISINFECTANT C—EXTREME COEFFICIENTS.

	Lowest.	Highest.	Difference.	Per Cent.
ax.....	7.5	10.45	2.95	40
ay.....	7.6	10.4	2.8	37
az.....	7.6	9.54	1.9	25
bx.....	7.7	10.	2.3	30
by.....	7.4	10.7	3.3	44
bz.....	7.5	10.4	2.9	40
cx.....	7.6	10.3	2.7	35
cy.....	7.8	9.5	1.7	22
cz.....	7.7	10.	2.3	30

The plates illustrating this experiment consist of the curves obtained by plotting the averages of the results. The abscissas are the numbers of tests, the ordinates are the dilutions of the disinfectants.

Solid lines are results with cultures grown in bouillon continuously (x). Broken lines are results when the cultures were grown on agar continuously (y). Dotted lines, when the cultures were grown alternately on bouillon and agar (z). Cultures y and z are identical in first test; y, only, is recorded.

A, B, and C are the three disinfectants, being phenol; a, b, c, the three different cultures used. The black lines show results obtained by Hamilton, the red, those by Ohno.

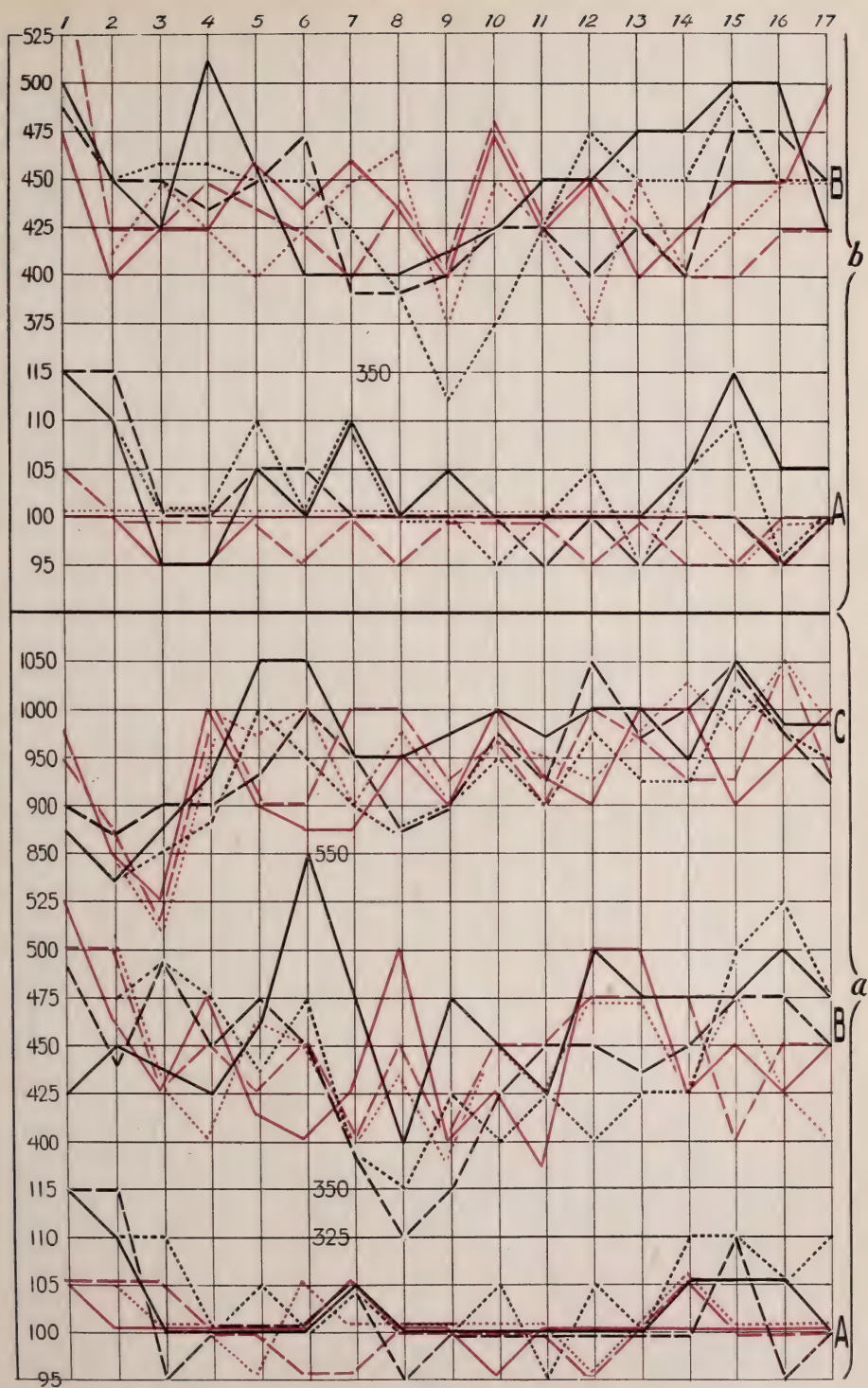
The location of the points determining the curve was obtained by using the average of the highest dilutions killing at $2\frac{1}{2}$ and 15 minutes. For example, in Plate 1, the first test of carbolic acid (A), with the culture first obtained from Washington (a), and grown continuously in bouillon (x) by Hamilton (black solid lines), gave an average dilution 115 this being half the sum of the two efficient dilutions, *i.e.*, that allowing no growth in $2\frac{1}{2}$ minutes and that allowing no growth at 15 minutes.

A straight black line separates the results obtained with (a) from those obtained with (b); an irregular line separating (b) from (c) begins between numbers 95 and 1050, on Plate 2.

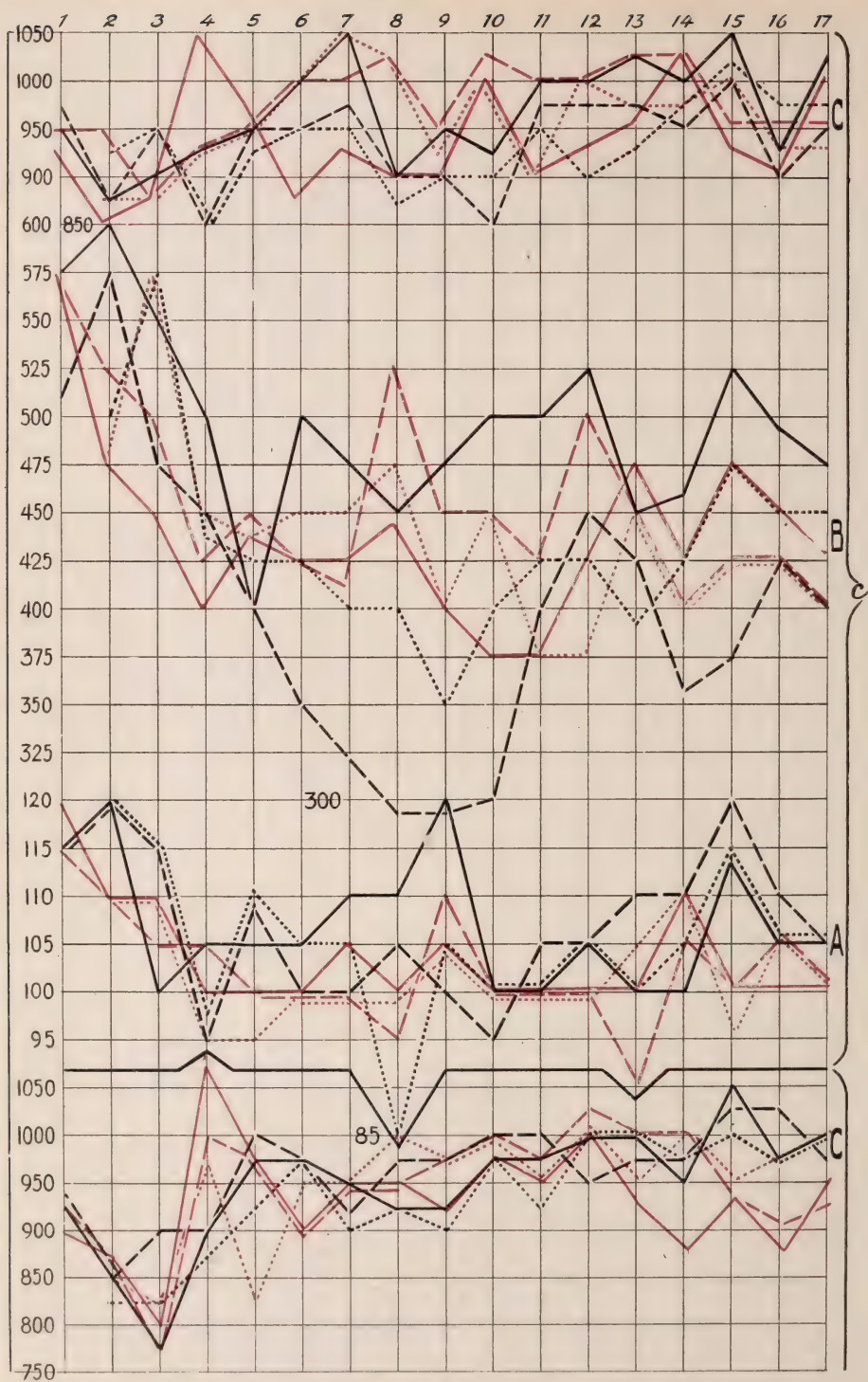
The zigzag character of the curves shows the very variable results obtained, while the fact that the red and black lines correspond so rarely shows that the medium used and the temperature of the incubator were not influencing factors since these were identical for both. One might conclude that culture (b), the second obtained from Washington and grown alternately on agar and in bouillon, gives the least variable results. The difference between this and the others, however, is only slight and unimportant.

We are not prepared at this time to explain many of the results shown in the above tables and curves. We may conclude, however, that certain unknown conditions very profoundly affect the resistance of the test organism. In fact, it seems almost unquestionable that the different and varying resistance of the test organism is responsible for more of the variable results than is the technique of testing.

We have shown that the Hopkins culture is more resistant than culture No. 0190 in either medium. The temperature at which the test is carried out is of secondary importance, but some certain temperature should be adopted for the sake of uniformity. The amount of the culture medium used should not be less than 5 cc., but it is only in the case where an amount of the disinfectant carried over in a loopful might be antiseptic in 5 cc. that any larger quantity is necessary. The amount of a healthy broth culture of the organism which should be inoculated into the 5 cc. of disinfectant is unimportant within reasonable limits. Results obtained



Nº 1.



by using 0.1, 0.2, 0.4 cc. did not vary more than the variation due to the personal factor.

The point at which the comparison with standard is made seems unimportant and so little is gained by comparison at two points that one may be omitted to advantage. An average in the extremes of time rather than averaging the results at two times seems much more logical.

We wish to suggest, therefore, the following points which, as stated in the introduction, might be used to advantage in attempting to standardize disinfectants.

The Test Organism. There are some objections urged against the use of *B. typhosus* but no other organism seems better adapted to the purpose. The Hopkins strain suggested by the Hygienic Laboratory is perhaps as satisfactory as any other, although one which is more sensitive to the disinfectants with a coefficient of 5 or over is more accurate since it shows finer shades of differences between samples. Culture No. 0190 has been in use many years, and while occasionally the bouillon culture has been noticed to change in its resistance, the agar culture seems to be exceptionally uniform.

Method of Growing. To obtain the greatest degree of uniformity in the vitality of the culture apparently requires very little attention other than that which is so essential in bacteriologic technique; namely, pure cultures, sterile apparatus, uniform temperature and medium in which to grow and an occasional comparison of the bouillon culture with a fresh culture from the agar.

The Culture Medium. A medium containing more nutriment than that adopted by the Hygienic Laboratory seems to give more uniform results.

Proportion of Culture to Disinfectant. An average amount of culture for inoculating, such as 0.2 cc. per tube of disinfectant, is sufficient for obtaining good subcultures, is easily measured, and is not an excess.

Dilutions of the Disinfectant. The dilutions of the disinfectant to be tested are logically those which are approximately proportioned to the dilutions of the standard. If phenol is the standard and the dilutions increase by addition of 10, a disinfectant with a coefficient of 2 may have its dilutions increase by 20, if its coefficient is 5, by 50, if 10, by 100.

Loops for Transferring Subcultures. These should be of No. 23 U. S. gauge platinum wire, the loop being 4 mm. inside diameter. The means by which they are sterilized can be left to the ingenuity of the individual worker. See AMERICAN JOURNAL OF PUBLIC HEALTH, Vol. 3, No. 6.

The Temperature During the Test. Any convenient room temperature such as 20° to 22°C. should be adopted and maintained by any con-

venient method during the test. That suggested in the article previously cited (AMERICAN JOURNAL PUBLIC HEALTH, Vol. 3, No. 6) is very satisfactory.

Seeding Tubes. While one more surely guards against contaminating the subcultures by using the narrow seeding tubes recommended in both the Parke, Davis & Co. and the Rideal-Walker Methods, the wide tubes suggested by the Lancet Commission and adopted in the Hygienic Laboratory Method are more convenient and in a laboratory where contaminating influences are at a minimum, the use of wide seeding tubes is recommended.

Time of Contact between Organism and Disinfectant. An average time of 5 minutes after which all organisms should be dead seems a logical time limit for the reaction to take place, and since it is convenient to use a difference of $2\frac{1}{2}$ minutes between times of subculturing the inoculated dilutions of the disinfectant, the logical way is to accept for comparison between sample and standard, those dilutions of each which fail to kill the organism in 5 minutes but which contain no live organisms in the $7\frac{1}{2}$ -minute subculture. All other dilutions and times of subculturing are non-essential under these circumstances and to eliminate them shortens and simplifies the process very materially. When subcultures are taken at only the two times; namely, after 5 minutes and $7\frac{1}{2}$ minutes' contact with the disinfectant, one person can inoculate five dilutions in $2\frac{1}{2}$ minutes, allowing one-half minute for each inoculation. Then, after a wait of $2\frac{1}{2}$ minutes, one proceeds with the subculturing, planting one from each seeding tube in succession and immediately taking a second subculture from each. The first test of a disinfectant whose coefficient is not known can be made with so wide a range of dilutions that its character can be determined; then the second test can be made in comparison with the appropriate standard. Ten dilutions should be sufficient in the second test to cover the necessary range both for the sample and the standard. With an assistant to shake the seeding tube after it is inoculated and to aid in subculturing, 15 seconds is sufficient time for each operation and ten tubes can be inoculated and two subcultures taken from each in 10 minutes.

The Standard. It has been noticed repeatedly that changes in the resistance of the test organism toward coal-tar disinfectants, having coefficients of 5 or over, are not accompanied by a corresponding change in its resistance toward phenol. The critical dilution of the latter appears not to fluctuate nearly so much as that of the coal-tar disinfectants with different strains of the culture and at different times of testing. It seems advisable, therefore, to compare disinfectants with standards of similar origin and approximately the same coefficient.

TABLE VII.
ILLUSTRATION OF PROPOSED METHOD.

Hopkins' Culture,
Liebig's Extract Medium,
Temperature—20°C.
Amount of Culture—0.2 Cc.

Minutes	Phenol		Disinfectant A*				Disinfectant B.*			
7½	—	+	—	—	+	+	—	—	+	+
	110	120	22	24	26	28	18	19	20	21
5	+	+	—	+	+	+	—	+	+	+

Coefficient A $\frac{24.00}{110} = 22 -$

Coefficient B $\frac{19.00}{110} = 17 +$

Steps in the process and time consumed for each.

Inoculating 2½ minutes.

Wait 2½ minutes.

First Subculture at 5 minutes.

Second Subculture at 7½ minutes.

* Dilutions of A and B are in hundreds.

If we have succeeded in proving the importance of the test organism and of the standard and the minor importance of many details in obtaining uniform results when testing disinfectants, and if our suggestions by which the process may be materially shortened and simplified receive consideration, the object of this paper will have been attained.

THE SINGLE TAX IN RELATION TO PUBLIC HEALTH.

LEWIS JEROME JOHNSON,

Professor of Civil Engineering, Harvard University.

Read before the Massachusetts Association of Boards of Health, Boston, April 30, 1914.

The Single Tax should affect the public health in at least two important and favorable ways, *viz.*:

1. By diminishing poverty and thus removing a fruitful *source* of disease; and
2. By rationalizing the tax system and thus making it easier to get adequate funds for the support of public health activities.

Taking up these points in their order,—I hardly need enlarge, in this presence, on the destructive effect of poverty upon the public health. Undernutrition, overwork, overanxiety, overcrowding, bad air, ignorance of laws of health and hygiene, inability to pay for proper medical attendance and care, filth, alcoholism and other destructive vices are all characteristic of our teeming slums and, to a greater or less degree, are fostered by poverty everywhere. These are all conditions incompatible with normal human life. The result is, accordingly, wide-spread disease and premature death with all their terrible consequences to society as a whole—to rich as well as poor. Not long since, I heard one of the most honored leaders in the splendid field of preventive medicine declare: “The employer who raises the pay of his help does more to stop tuberculosis than all we doctors can do.” Clear as was his testimony as to the bearing of poverty on public health, almost equally impressive to me was the possible implication that, master as he was and is of the more obvious branches of his specialty, he had not yet given vital economics enough study to realize that wages are not to any publicly important degree in the control of an individual employer. Many another leader of public thought has drifted into so narrow a view of his specialty that he has failed to behold, and perhaps has even failed to look for the vision of bright hope which vital economics holds out to those who have eyes to see. By vital economics I do not mean the conventional political science of the schools, frequently dubbed the “dismal” science. I mean the science of the production and distribution of wealth as an applied science man would face it, study it and develop it, with the intention of finding in it some light, with the intention of using its teachings to solve human problems, to *bring something to pass*, even it may be, to eliminate the poverty which is proverbially the destruction of the poor, and, what may be almost as disastrous a public evil, the ever-

haunting dread of poverty which oppresses and fetters the fairly well-to-do and even the rich. Let economics be studied with the care and constructive purpose with which sanitarians, bacteriologists and engineers study their other problems (for economics is a problem of every profession) not merely as part of the fascinating search for truth for truth's sake, but also for the establishment of truth for suffering humanity's sake. Let economics be discussed as you and I discuss our other professional problems, in the spirit in which I am glad to have the honor and privilege of accepting your invitation to address you today. I believe that the result of such study will be the development of an inspiring science, not a dismal science, and one which has much to suggest toward the lightening of your task, and toward the enhanced safety and happiness of civilized man. Its relation to political economy as the term is now used may be expected to be much like that of modern engineering to pure mathematics. Tangible results from our discussion of today may not be immediate, but I believe it is the natural function and destiny of men like you, men of applied science training or bent of mind, regardless of profession, to lead in securing such results,—for whatever may be said for the more literary or bookish mind, nurtured on precedent, steeped in the past, it can be hardly said to be signally constructive in its effect on great public problems.

Momentously beneficent as has been the contribution of applied science in the last century and a quarter—in your field and in my field—I firmly believe the same spirit entering the field of the great social and political problems is destined to render a parallel and perhaps still greater service. It cannot be *natural* that so many of the most industrious should spend their lives in misery and want in these days when the command of steam and electricity has brought to man the power to produce necessities and comforts of life in quantities simply undreamed of a few years back. And if it is not *natural* that poverty should persist, it needs only the removal of its artificial causes to have it disappear. It is appropriate for applied science men, men who expect and are expected to make things of importance happen,—and to do it even in the face of serious obstacles—to be attracted to this problem.

I will now attempt to state some of the basic axioms, as I see them, of vital economics.

All wealth, all the material good things of life produced by human agency and for which we give our money, comes from the use of land. Land is essential for their production, a right of way over land is essential for having them brought to us, land is essential for factories, wharves, warehouses, banks, markets, and every other step in the processes of production and distribution of goods. The use of land by labor is essential to the production and distribution of all the wealth produced each year on this planet.

The use of land is essential for maintaining a home, a church, a school. Including as does the word land (in the economic sense) all the gifts of nature, it is not hard to see that *land is the basic necessity of human life*. No man produced it. It is the common heritage, as it is the common necessity of all men. The conditions of its ownership and use demand, accordingly, our first and closest attention.

Equally patent is the fact that some land is vastly better suited for getting a living and enjoying life than other land, *i. e.*, some land is vastly more valuable than other land. To what is this value due, and who gets it, and in return for what? The main factor in the value of the most important land, we may say practically the only factor in Massachusetts, is the assemblage of people into communities. Each resident of such a locality secures an increased labor efficiency and comfort due to the division of labor possible only in centers of population. He enjoys also a comparative economic security due to nearness to a large number of jobs, or a large market or a large labor supply. There are various other causes for the drift of people to cities. Much of this drift is natural, but no small part of it is due to needless burdens laid by our tax laws upon farm and village life. Urban land offering to its occupants such attractions is consequently in sharp demand and its market value goes up accordingly. Land in centers of population, such is the competition for it, commands a price of millions of dollars per acre. For example, as a minor but near-by illustration of the value of urban land, the present assessed value of the land of Boston, Cambridge and Somerville alone is greater than that of all the rest of the state of Massachusetts put together, greater than all the other city land and all the country land from Barnstable to Berkshire and from Essex to Dukes. Again—a farm worth \$50 per acre half a mile wide and girdling the earth ten times would not quite equal in value the assessed value of the bare land of New York City.

The income from these enormous community-made values now flows, in the main, into the pockets of individuals, in return for practically nothing.

Such a situation at once challenges attention.

It would seem natural, moreover, to inquire, in the face of our poverty and disease problem, whether such a vitally important resource as valuable land is used to its capacity, and if not, why not; and whether and how evil conditions in this quarter may be remedied.

It can be readily shown that there is room in our little Massachusetts, a mere speck on the map of this country, to house the whole population of the United States in detached one-family houses, five to six persons in a house, with a quarter of an acre of ground per house. Even then the density of population of the state would be no greater than that of Boston—and more than one half of Boston land area is vacant—and only one eighth as dense as that of Manhattan. We have obviously only scratched the resources of

this country. Germany with her 65,000,000 people is prosperous in a space one fifth smaller than Texas and one of her leading economists, a lecturer at the University of Berlin, told me the other day that Germany has arable land enough to support in comfort double her present agricultural population. Our poverty is plainly not due to *lack* of good land—but to the fact that it is not in use.

The poverty question, and, to a large extent, the health question, is thus shown to be the land question. We see that there is something radically wrong when valuable land is not in use, while labor and capital are alike eager to use it, if it could be had on fair terms, and humanity stands in the midst of increasing cost of living in serious need of the food, clothing and shelter which the normal use of land would permit them to enjoy. Unthinkable as it may seem, something is evidently making it advantageous to its owners to keep this great source of wealth out of use or only partly used.

Where is some of this unused or underused land? Is it where it would at once affect the health problem?

A glance at any of our cities at once reveals vast tracts of vacant or ridiculously under-improved land within rifle shot of swarming, filthy slums.

A recent Parliamentary Return reports that two thirds of the area of 1076 British urban districts—containing more than three fifths the population of England and less than one ninth its acreage—is rated as agricultural land. A quarter of the area of the swarming city of Manchester is rated as agricultural land. In the little Welsh city of Rhondda, notorious for bad housing, with a total area of 23,885 acres, 19,888 acres are rated as agricultural land.

To come nearer home, in the twenty-six wards which constituted municipal Boston in 1912, there was, according to the report of the Assessing Department of that year—the latest issued—vacant land (including marsh and flats, but not including parks, streets or backyards) aggregating 54 per cent. of the taxable land area of the city. This land is so valuable that it is assessed for more than all the land of Franklin, Hampshire and Worcester Counties (outside of the city of Worcester) put together. The marsh and flats amounting to 11 per cent. of the taxable land area of the city and 2 per cent. of its land valuation are assessed at more than all the land of Hampshire County, including the city of Northampton.

Why is all this valuable land out of use?

Is it not perhaps because we overtax the use of land and undertax the holding of land? Is it not because we have failed to recognize that the great values which attach to land are people-values, are logically the people's property, and are the natural automatic revenue for meeting the common expenses which develop *pari passu* with the land values as the people gather in communities? We spend public money for improving the port, extending streets and parks. What at once rises in value? Water front

land, land near the improvements. Do we take this value for paying the bill as Frankfort does? Only to a slight extent, and then we lay a heavy tax on people's houses, machinery, stocks and bonds, or their incomes and their hard-earned wages to make up the deficit, a crushing burden on property the value of which is not advanced one cent by the outlay.

The result of this undertaxing of land holding, and the consequent taxing of land using, the taxing of capital, personal property and all sorts of improvements in and on land, is simply to foster non-use and under-use of valuable land to the extent we see all about us. The one thing a city land owner can be certain of, as he contemplates erecting a modern building on his lot, is that there will be an annual inexorable tax penalty hanging over him if he makes the improvement and in proportion as he makes it a good, well-built, substantial and fire-proof structure. He may well conclude that probably the safest and most profitable thing for him to do, under the circumstances, is to let the old shack stand or leave his lot vacant and content himself with the bounty which a growing community stands ready to bestow on him for merely holding the title to the land.

As population increases and concentrates, and land is held at fancy prices beyond what legitimate business can afford to pay, a shortage of houses develops, the proportion of available jobs to seekers for work drops, wages drop, the scale of living drops, people become hardened, I should say benumbed, to the endurance of obsolete dismal tenements and the result is the city slum and its distressing problems.

We must stop taxing—gradually to be sure, but as rapidly as the public can be induced to see the vital importance of doing so—personal property, buildings, machinery, and all other products of labor essential to the advantageous use of land, including the value of clearing and draining. We can make up the difference by a larger levy on the location-value of land. We can thus collect the public's own earnings, and cease to let them fritter away into the pockets of the small fraction of the people who merely hold titles to land. Of all speculation in the necessities of life, speculation in land is doubtless the worst, for it chokes off the production of wealth at its source. It corners that necessity of life from which all other necessities must come. In proportion as land is held idle, the size of the earth is for practical purposes by so much reduced, and that too in its most valuable portions. The result is harmful to everyone. We need not waste any breath scolding the landlord. He is only managing his property in the manner which our laws make most profitable for him. But we can change these laws, and he, in proportion as he knows his own interest, will be glad to help—that is, unless he is determined upon the career of a mere passenger in life's journey. Any cases of undue hardship which might arise in course of the readjustment could readily be taken care of by special measures.

The Single Tax, by taking the public revenues only from the public's own natural earnings,—the value that comes to land as the community grows and dwindles as the community dwindles—would at one stroke make the use of land so much more profitable than the mere holding of land out of use that the beneficial effect on industry, housing and human life generally would be hard to over-estimate. The operation would be radical and simple. It would replace an unnatural condition with a natural and wholesome one.

And yet some people say it cannot be done. The answer is, it must be done. Moreover, it is being done. The largest body of organized support for the Single Tax is, as might be expected, among farmers. The farmers of the Canadian Northwest are for it by the thousands. They know that the site value of their farms is slight. They know that farmers are among those least benefited by public expenditures and hence *should* pay the least taxes. Cities, in proportion as they collect, as taxes, the site value of land and exempt personal property, houses, and capital experience the benefits predicted. The rapidly growing cities of Vancouver and Houston, in the former of which buildings are not taxed at all, while in the latter they are taxed at only about a third the rate on land values, are among the cities which have felt these benefits, including marked reductions in house rents. Pittsburgh and Scranton are well started toward a similar taxing system. New York seems to be getting ready to follow suit.

It must be observed that the increased use of land must mean increased demand for labor, increased wages, and that greater independence for the worker which would enable him to refuse to live in noisome tenements or to accept work in unsanitary factories. He would no longer need or tolerate paternal watch-care by the state, nor have to form unions for self-protection. Buildings would multiply so that capitalists owning houses would have to compete for tenants just as capitalists building automobiles now compete for purchasers. The owner of slum land, then, having to give up in taxes the bulk of the income from his mere location to which the community, not he, gives the money value, would have to build better, would have to put in more capital on which to get his former return; moreover, he could the more readily afford to do so as there would be no tax penalty awaiting him for so doing.

Rural and farm life relieved of its abnormal, and well-nigh crushing tax burdens should assume its natural attractiveness to human beings and the abnormal flow to the cities should diminish or cease. We now simply tax people into cities; no wonder they go.

Increasing the economic independence of all workers in the only way it can be done, by opening to industry the natural opportunities which nature provides at our doors, should gradually drain the slums of their congestion,

though it may take some time wholly to wean slum dwellers from the glitter and horrors of the life to which so many seem perversely devoted. As the dire necessity to endure slum conditions gradually disappears, we may fairly hope and believe that the slums, the breeding place of squalor, disease, alcoholism and vice, the baffling menace to health and stability of society, will also disappear.

The second point I mentioned—the rationalized tax system and more fruitful source of public revenue to be expected under the Single Tax—remains to be given a word.

Space does not permit going fully into the merits of the Single Tax as the solution of the taxation problem. The Single Tax can be collected more fairly, more certainly, more cheaply than any other; it would not repress but would foster industry; its most striking immediate effect should be to bring advantageous land-ownership and use within the reach of all; it would put land ownership on an impregnable basis by divesting it of the unnatural privilege of absorbing community values and tend to make us a nation of land owners, while now we are tending to become a nation of tenants—but all this can only be hinted at here.

With the public taking as taxes only its own rightful earnings,—earnings which by the way are enhanced by the wise and economical expenditure of the taxes,—every citizen contributing, and contributing in proportion to the benefits received and not in disproportion to his ability to pay, with a fair and proper division of expenditure between local and state treasuries, with greatly increased industrial activity and wealth, with taxes no longer choking off their own source, we could hope to induce the public to spend enough of its own to provide as we have never done yet for really adequate hospitals, medical, surgical, chronic, children's and maternity; proper clinics and dispensaries; visiting nurses and social science staff; medical inspection of schools; the suppression of dust and other public nuisances; better water and sewerage systems; better housing inspection; better milk and provision inspection, and many other things we have to do so inadequately, for we simply cannot now find the money with which to prevent disease and to preserve health and save life.

We should have the community's natural source of revenue at our disposal. If it did not suffice, with fair division of the proceeds between central and local government, it would be because we wasted it or were simply living beyond our means, and our means are limited only by the then normally available resources of nature under the transforming influence of labor and its natural friend and ally, capital.

Let me point out in closing this brief paper that the Single Tax contemplates not an extension of the functions of the state, but rather a reduction of them; not less individual liberty, but greater individual liberty. It

offers freer scope than ever for individual initiative—in all but schemes for private pocketing of public property. It involves not an increased tendency to public ownership of land and all capital, but a reduction of the temptation to so hazardous a venture. Moreover, it is a program well suited to be entered upon tentatively. If a beginning of increased taxes on locations, with exemption of all other property—something which may be tested at first in restricted localities—did not improve conditions, the way would always be open to turn back, just as it would be to go further. Such tests are being made with promising results. The tendency is to go further. People once out of the old rut do not tend to resume the primitive custom of levying upon private earnings in order that location owners may enjoy undisturbed their expected chance to absorb, without return, the public's own earnings.

Could anything be clearer than that steps in the direction of the single tax are worth considering? Could any program be more inviting and hopeful to a body of men who have grasped the great fact that compliance with natural law and justice is essential to human and social health and peace? I believe that study of the economic aspect of the health problem will convince you, as it has me, that until we have land brought reasonably into use, efforts for public health are at lamentably and intolerably low efficiency. With the natural resources of the country in normal use, I believe we can hope for economic health and its attendant mental comfort and physical health, to a degree that sounds Utopian only because our conceptions are distorted by long contemplation of nothing but economic maladjustment. With such a hope once clearly seen to be reasonable, effective steps toward its realization cannot long be delayed. The difficulties will dwindle as we approach them; the benefits will grow increasingly impressive.

WAKEFIELD AND STONEHAM EPI- DEMIC OF SEPTIC SORE THROAT.

DR. F. L. MORSE,

State Inspector of Health, State Board of Health of Massachusetts.

Read before the Massachusetts Association of Boards of Health, Boston, April 30, 1914.

On February 27, 1914, my attention was called to a large number of cases of tonsilitis which had occurred in the town of Wakefield upon that day, and an investigation of the possible source of infection was commenced. On the following day, cases were also found to have occurred in the neighboring town of Stoneham, and consequently the investigation in both places could be carried on at once.

The different physicians practising in both towns were interviewed, and an attempt was made to obtain from them a list of the patients whom they had treated, but on account of the extensive and explosive character of the infection it was impossible at first for the physicians to give a definite and accurate list of their patients, for in many instances only single visits were made by the physicians and no written record kept of the visit. Furthermore, many patients were treated by the physicians at their offices, and a considerable number of others consulted no physician at all. All together it was estimated by the chairman of the Wakefield Board of Health that in the neighborhood of 1,000 persons were attacked with the disease.

In order to determine the cause of the infection immediately and to restrict it, if possible, the cases in the town of Stoneham were first studied. Of the first twenty-eight patients visited, twenty-seven of them obtained milk from one dealer, and with this information the Stoneham Board of Health were advised, on March 3, to order this dealer to deliver no milk in Stoneham unless it had been previously pasteurized, which order became effective on March 4.

At Wakefield, of the first 181 cases investigated, 176 were found to obtain milk from the same dealer, and on March 4, the Wakefield Board of Health were also advised to allow no milk from this dealer to be delivered in their town unless pasteurized, which order became effective on March 5.

Up to March 4, on account of the extent of the epidemic, it had not been possible to devote any time to the study of the milk supply in order to determine the source of the infection, all efforts being confined to the analysis of the cases. On March 4, however, in company with Dr. A. H. Rose, the veterinarian of the State Board of Health, a visit was made to the milk dealer in question and a list of his dairies obtained. It was found that he distributed between 130 and 140 cans of milk daily in Wakefield

and about 55 cans in Stoneham. In each town, some was delivered in cans and bottles to stores, and the remainder in bottles to private families. He obtained his entire supply from nine different dairies, seven of which were located nearby in the towns of Wakefield, Lynnfield, and Wilmington, while two dairies were located in New Hampshire. In addition, this dealer also sold about 40 gallons of cream weekly and 40 gallons of butter-milk weekly, both supplies being obtained from the Milford Creamery, Milford, N. H. Visits were made to these dairies and the methods of handling the milk at each place studied, and it was not long before the probable source of infection was found.

The dairy in question was located in the town of Lynnfield and produced about 50 cans of milk daily, some of which was bottled at the dairy, the remainder being taken in cans to the milk room of the distributor. It was customary for the distributor to mix all of his milk together, and from an investigation made of his milk room it appeared that the conditions were favorable for carrying on his business. The floor was of concrete construction and the facilities for washing the bottles partially adequate, the exception being the absence of live steam to sterilize the bottles. The milk was bottled with an improved bottling machine, after which it was iced until ready for delivery.

At this farm, the cattle were all tuberculin tested, and the floor of the barn was of concrete. It appeared that the greatest care was taken in handling and milking the cows, for each man was required while milking to wear a white duck suit for cleanliness.

At this farm it was found that A, with two other men, did the milking and that A was ill with tonsilitis on February 3, being attended by his family physician, and that a peri-tonsillar abscess formed which broke on February 7. This man was improved on February 10, at which time he went to the barn but did no milking. On February 15 he was ill again with an abscess formation on the other side of the neck, which broke. He had recovered from that affection and returned to work on February 24, when he began to milk. His wife, who also did some of the bottling of the milk, was ill on February 25 with a slight sore throat and cold in the head. Besides bottling she also washed the milking pails and utensils.

With the discovery of these two cases of tonsilitis at the dairy, the local boards of health were advised to restrict A and his wife from handling any milk. The first cases of tonsilitis occurred on the evening of February 26 and increased in numbers during the 27th and 28th, followed by a cessation on March 1 and an increased number during the 2d, 3d, and 4th. With the pasteurization of the milk, commenced in Stoneham on March 3, and in Wakefield on March 4, and the restrictions imposed upon these two people, A and his wife, from handling the milk, the cases rapidly decreased

in number and few appeared after March 7 except possibly from direct infection from other cases in the same family.

At the milk room of the distributor the conditions for pasteurization were rather crude and a temporary pasteurizing outfit was provided by immersing the bottles of milk in a wooden tank containing water nearly up to the tops of the bottles, then introducing steam from a boiler up to a temperature of 145 degrees Fahrenheit, keeping the temperature at that point for thirty minutes, then allowing the milk to slowly cool. With the institution of pasteurization and the restriction of the infected persons from handling the milk, the epidemic rapidly subsided.

At the milk room the proprietors were further advised to obtain a washing outfit so that the bottles and cans could be sterilized with live steam. Accordingly a new boiler was also procured in order that this recommendation might be carried out.

Many cultures were obtained from patients ill with the disease, also from the throats of the two persons suspected of infecting the milk supply, and an examination of these cultures at the State Board of Health laboratories disclosed hemolytic streptococci present in all cases. Subsequent examinations were also made of the two persons at the dairy and it was not until April 11 that negative cultures were obtained, at which time the Wakefield Board of Health was notified that the restrictions first recommended could be removed, but they were urged to advise particular cleanliness and careful habits of those handling the milk supply.

During this epidemic, three instances occurred which pointed directly to the source of infection. In one family at Wakefield, consisting of eight members, with the milk supply from this dealer, seven of them were sick with tonsillitis and the other member who was not sick was the father of the family who never used any milk. In another family in Wakefield two members were absent from February 24 to March 2, returning home on the latter date and using the infected supply; they were ill with the disease on the following day. In another case at Stoneham, the patient living in a remote part of the town and having another milk supply visited her sister in the middle of the town on Thursday afternoon, February 26, and had lunch there, drinking a glass of milk, and on the following day she was ill with the disease.

The complications accompanying the affection were occipital headache, septic ears, tonsillar abscesses and cervical glands, many of the latter not appearing until the second and third week of the disease.

During the outbreak it was suspected that the water supply of the town obtained from Crystal Lake might have been the cause of the infection, but as cases occurred in Stoneham which obtained water from a different supply, this could be immediately eliminated. It so happened, however, that on February 27, the State Board of Health advised the town

of Wakefield to discontinue the use of Crystal Lake water on account of the presence of colon bacilli in the supply, and on February 28 Metropolitan water was introduced into the town for the use of the inhabitants.

The conclusions reached are consistent with those of the Baltimore epidemic of septic sore throat in February and March, 1912, when it was concluded—

1. The prevalence of sore throat should be reported to the health authorities, and it appears that if the first case on February 3 at the milk farm had been reported, and the man restricted from handling the milk, the epidemic would have been prevented.

2. It is possible for raw milk from any dairy, however carefully produced and handled, to convey a streptococcus infection.

3. Thorough pasteurization of clean milk in its final container is of greatest importance.

4. Boil milk which is not pasteurized.

5. The milk inspection as at present conducted is inadequate.

Discussion.

DR. THOMPSON: I should like to ask if there is any significant eruption connected with these cases anywhere on the body?

DR. MORSE: None at all, Doctor.

DR. THOMPSON: Is it possible to ascertain the period of incubation of the disease?

DR. MORSE: If this man infected the supply the first day that he went back to milking, February 24, and that milk was drunk February 25, cases occurred within twenty-four hours and continued to occur as long as he handled the milk. With the pasteurization of the milk and the restrictions from handling it the disease promptly diminished in numbers. Practically twenty-four hours, I should think, would be the incubation period.

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FLORENCE NIGHTINGALE'S WORK FOR PUBLIC HEALTH.

The recent publication by Macmillan in two thick volumes of what is likely to be the final and most authoritative life of Florence Nightingale, makes it possible to estimate as never before the true place of this most extraordinary woman in the public health movement of the nineteenth century. Miss Nightingale was, of course, primarily an administrator, an executive, a teacher, and above all else a mighty force and inspiration. But she was also passionately fond of figures, and might easily have done original work in statistics, especially in vital statistics, over which she spent many sleepless nights, and which she was fond of discussing with so great an authority as Dr. William Farr. As it stands today she belongs among those British pioneers, largely laymen, of whom Edwin Chadwick, William Farr, Lyon Playfair and Charles Kingsley are good examples, whose work

was much like that of John the Baptist, namely, crying in the wilderness, and preparing the way of the Lord. We refer now not to Miss Nightingale's great work as the founder of trained nursings, itself a contribution to the public health of the highest value, but rather to her preaching and teaching specifically directed toward sanitation and the general improvement of the public health.

At the very beginning of her first great work, that in the British military hospitals of Scutari (Turkey) in the Crimean War of 1855, she saw that nursing was in vain so long as the buildings, imposing to look at, were veritable pest houses, beneath which were sewers of the worst sort, "loaded with filth, mere cesspools in fact, through which the winds blew sewer air up the pipes of numerous open privies, into the corridors and wards where the sick were lying." There was also "frightful overcrowding and no proper ventilation." "It is impossible," she says, "to describe the state of the atmosphere at night." This was in March, but by June she had got the hospitals into such a condition that "they compared favorably with any in Europe."

But what is most remarkable of all is that she put her finger almost instantly upon the cause of all this sanitary neglect, namely, the total lack of hygiene and sanitation in the medical education of the time. "There is nothing," she wrote, while discussing the neglect of the most ordinary precautions in the hospitals of Scutari, "there is nothing in the education of the medical officer which would have met the case of the hospitals." When we remember that it is only since 1898 that our own Army Medical Service has given due heed to education in hygiene and sanitation, and recall our own bad record in the concentration camps of the Spanish-American War, it is startling to find that we were then nearly half a century behind the British. For in 1860 Florence Nightingale had the satisfaction of securing for the British army the establishment of an Army Medical School and the appointment of Dr. E. A. Parkes to the chair of hygiene in the new school.

This splendid achievement alone would have placed Miss Nightingale among the pioneers, but when we consider in addition her long and fruitful struggles for the improvement of the public health of India; her recognition of the need of having less heroic and fundamental work in supposedly enlightened England; her insistence upon education in hygiene and sanitation as the only hope of betterment in any community; and her perception of the necessity of village sanitation; besides her foundation work for trained nursing and district nursing—the full significance of which is only just beginning to be felt by public health authorities—we have pioneering so great and so effective as to make secure the name of Florence Nightingale among the immortals of sanitary science and public health practice. It is greatly to be hoped that her "Life" may find a high and permanent place in all libraries, laboratories and workshops devoted to the theory and practice of hygiene, nursing and sanitation.

FLIES AND FILTH.

SAMUEL MILLER,
Board of Health, Malden, Mass.

Read before the Massachusetts Association of Boards of Health, Boston, April 30, 1914.

The importance of ridding communities of the fly is too well known by you to need any explanation at this time.

Already the growing interest of the different societies makes it imperative for us to be active. The time to begin is now, this month, when we can reach the first spring breeders, thus saving millions in July and August.

We know that where we have filth we have flies, and the dirtier the premises, the more flies.

When we want food for our own families we do not pick out the filthy storekeeper to buy from, we will put ourselves out to get to the cleanest place we know, and why? Because we realize we might bring to our homes some disease.

One of the places out of the ordinary where I have found flies breeding, was in an old-fashioned sink in an old house, in a feather pillow that had collected moisture.

The premises were overrun with flies and the people sent for me to see if I could discover where they all came from. The house was fairly clean on the inside, and on the outside there were no outbuildings or barns that would account for them. But upon opening the door under the sink I soon found the breeding place.

According to our best sanitarians, flies breed disease; that point I think you will all concede.

Disease does quite often cause poverty; poverty breeds crime; a deplorable condition which is preventable.

I think possibly some of you can trace these conditions back to some case that has come to your attention and verify my statement.

The fly, I claim, is a curse. If we only could get right down to cold dollar facts, the figures would be appalling in regard to the food products that are annually destroyed. There is one thing that, since I was a small boy, I well remember, and that was going to the meat market for some steak; the old gentleman who waited upon me was the deacon of the church where I attended. The old-fashioned meat block was covered with flies, and boy fashion I said, "Deacon, what were they made for?" His answer was, "I don't know what the Lord made the dum things for any way, and I don't think any of us do."

My contention is that all food products should be properly screened or kept under glass where they will be protected. Where is the business sense of a person who will allow flies to roost upon food products?

The loyal sanitarian is laboring at all times to educate the masses in regard to the best mode or modes of getting rid of the fly, and properly so, for I claim he is the man best qualified to do work of that kind, providing that he has had proper training. Who knows the filthy breeding places better than the sanitary inspector?

The flies of the north with which we have to contend are:

First: The common house-fly (*Musca domestica*), which is a medium-sized, grayish fly. This fly cannot bite as its mouth parts spread out at the tip for sucking up liquids. A great many people think that this species does bite, but, not being able to distinguish the different species, are mistaken. The common house fly, like other flies, breed in manure and are found wherever man is found.

Second: Another fly which is known as the stable fly (*Stomoxys calcitrans*) and is quite often mistaken for the house-fly. Its mouth parts are formed for piercing the skin. It is nearly as abundant as the house-fly.

Third: The so-called cluster fly (*Pollenia rudis*) is a frequent visitor of the house. It is somewhat larger than the house-fly, being dark-colored, with a smooth abdomen and a sprinkling of yellowish hairs. At times this fly invades the house in large numbers and causes great annoyance.

Fourth: The real stable fly (*Cyrtoneura stabulans*).

Fifth: Another, the so-called blue bottle fly (*Calliphora erythrocephala*), and is commonly called the blow fly. It breeds in decaying meat or animal matter.

Sixth: The green bottle fly (*Lucilia Caesar*) which breeds in cow dung and is sometimes found in houses. This species I have found in houses where there have been cases of infantile paralysis. I do not mean to infer that they cause that disease for I find bedbugs and mosquitoes as well.

Seventh: A smaller variety of house-fly (*Homalomyia canicularis*) which at times are terribly annoying.

These are the most annoying and dangerous flies that we have and for their extermination, out of doors, I use the large trap, the treatment of manure with copperas, lime or acids, and insisting that all places where they can breed be kept clean. In the stores and homes, I recommend the use of the small house trap, sticky fly paper, and, where it is possible, insect powder. Also I am a firm believer in swatting the fly.

Nature helps in a great many ways in destroying the flies. There is the fungus disease that carries off millions every year; then there is a small red mite that attacks them, and this is sure death, besides other things such as spiders, and in the southern states centipedes are great fly killers.

For the general public, we should set the example, by keeping all places under the control of the public authorities in a cleanly condition. Have a proper incinerator or incinerators for the disposal of all garbage and filth, thus doing away with the public or private dumps, or garbage sheds.

There are a great many difficulties for the public agents to overcome. The indifference of the public, often to a point of open hostility, when it comes to the financial part. As a rule, it is not the poor man that is the objector, but the wealthy real estate owner, who seems to think that he is misused. Then again, it is the inertia of the public authorities who often think of these pests and dangerous flies as too small to notice, but would jump over large obstacles and break down all laws to gain a less worthy object.

Why are all of the best sanitarians working for the elimination of the fly? To help save the lives of approximately 50,000 children during the summer months alone from bowel trouble. To help to reduce the number of cases of typhoid with its attendant money loss. To help to reduce the number of cases of tuberculosis, which is so easily spread by the fly.

In certain quarters, the sentiment is growing. Let us help it, shout it from the hill tops, on the street, or wherever we get a chance. It is up to the local Boards of Health to do, so let us begin now, today. Encourage all clean-up movements, and let us take for our slogan that good old word "cleanliness."

Discussion.

MR. JOHN RITCHIE, JR.: The question of the fly is, indeed, a serious one for consideration after the talk and long papers of the session already. I have held for my own general belief with reference to the fly that in well sewered cities, that are properly taken care of, the excitement about swatting the fly has been carried to an undue extent. In a company like this, which represents a great many rural districts, in which the outhouse is a serious factor and a matter that is exceedingly hard to care for, it is the outhouse that should receive the immediate attention of those who are in the fly-preventing business. I am not a fly swatter. I believe myself in the doctrine of the fly prevention. I think that the fly trap gets for you a nice little sample of what there is in the vicinity, but it is not an instrument that is striking directly at the root of the thing. What we most need everywhere is the prevention of the fly, the cleaning up of the localities so that the twelve days of stationary filth which are necessary for the fly to breed will not be possible. There are deep problems in this, in the alley of the small town, in the barnyard, in the outhouse of the rural community. The fly is in those communities a reasonably serious problem. It is for the rural boards of health to devise some way by which it can be overcome. I think the matter has been taken up already by Howard and by co-workers on the Canadian side of the line, and that we are presently to have something very definite in the way of treatment of manure heaps, because the economic end of it is a serious thing. It is perfectly easy to say to the farmer, "Screen your barnyard." He cannot screen his barnyard. It is perfectly easy to say to him, "Dose your manure heap," but the manure heap is his cash, it is his money, and he cannot put on to it kerosene; he cannot treat it in crude ways which will interfere with its economic value, so that that remains at the present moment a problem in the country. But, as I understand from Doctor Howard, we are to have presently a report. Before all becoming fly swatters, before all becoming manure dosers, we had better wait for this report. And meanwhile let me suggest to those in the out-of-town districts that attention be paid to the outhouse, that it be so screened, that it be so constructed in the first place, that it shall not be the congress place of all the flies in the neighborhood, and then, in the second place, see that the outhouse itself is properly protected, so that the flies that are in there cannot get out, the flies that are outside cannot get in.

AN OUTLINE PROGRAM FOR THE TEACHING OF SEX HYGIENE IN THE SCHOOLS.

ROBERT N. WILLSON, M. D.,
Philadelphia, Pa.

Read in the International Congress on School Hygiene, Buffalo, N. Y., 1913.

It is my object within very compact space to demonstrate a tentative scheme for the teaching of sex hygiene in the schools. I trust it will appeal not only to the fancy, as desirable (though not ideal), but far more to the executive common sense of those who have it in their power to see that the necessary steps are taken to introduce some form of teaching in the schools. It seemed a far cry to those of us who were at work in this field twenty years ago to the eager demand for sex instruction and sex knowledge that is heard today on every hand from the parents of children. A long, hard road has been traveled, the first portion very steep and hazardous, the latter part so easy as almost to appear treacherous.

It is, therefore, as strange as it is amusing to witness a number of newcomers in the territory, albeit in certain instances men who have won their teaching spurs in other phases of pedagogy, venturing to exclaim against the matter and method suggested on the basis of years of experience, and above all to criticise the name "sex hygiene." One of these prominent critics, always unique, if not always precise in the logic of his arguments, asserts boldly enough that he has "everywhere found thoughtful people much aroused upon this subject, usually in its misstated form of 'sex hygiene.'" And again, "In fact, this subject has nothing to do with hygiene. I say this as one whose chief work in life is to promote hygiene."*

Another, a teacher of teachers, tells us that the term sex hygiene is "altogether too limited as a general designation for the desirable instruction concerning sex and reproduction." In his turn he suggests "sex education" or "sex instruction." He fails to observe that either of these is so much narrower than the term sex hygiene as to include only one of its departments.†

I wish, at the outset, to pause long enough to say that of all the characterizations suggested for the general subject of sex health, and sex knowledge, and sex instruction, the most comprehensive, the most apt appears to me to be sex hygiene. He who ventures to tell the public that the movement to instruct the present and future fathers and mothers and teachers

*R. C. Cabot. *American Youth*, April, 1913.

†Bigelow. *Religious Education*, April, 1913.

of children in all they should know regarding sex nature, about the object, sacredness, and care of their sex organs, and concerning the part their health or unhealth plays in heredity—he, I repeat,—who presumes to say that these vital subjects fall outside the boundaries of sex health and sex hygiene, simply does not understand the use or the meaning of the word hygiene. Hygiene as used today means the science of the preservation of health, mainly by prevention, in a measure by remedial measures. Sex hygiene means the science of the preservation of the sex or reproductive talents and organs mainly by prevention, in a limited measure by cure. Sex hygiene is from a start to finish a sanitary movement, dealing with the development and maintenance of moral and physical health. Sex hygiene deals with the sex health of the present, in order that it may insure the sex integrity and, through it, the general health of the future. Sex hygiene is the main safeguard of heredity, in that it looks primarily to the integrity of the parent through the rational means of a full knowledge of the object, the proper employment, and the conscientious preservation of the sex nature of the individual for the sake of the child of the future. From first to last the field that has been denominated sex hygiene is a sphere of activity, the sole and only reason for the cultivation of which is the sum of the health of the children, which constitutes the public health. Therefore, and with good reason, I think, is this eager struggle for the sex health and, through it, every other department of the health of our children and of their children, termed sex hygiene. The word has come to stay, and there could be none more appropriate!

THE TEACHING OF SEX HYGIENE.

The whole subject must be divided at once into the teaching of adults, and the teaching of children. In a certain sense all of us are beginners at this stage. All are grouping their way toward a satisfactory grasping and presentation of the material, and primarily toward the furnishing of a properly equipped body of teachers. But apart from this fact, we realize that many, if not most, adults must unlearn that which they think they know and begin again as children. We therefore, divide the work at the outset into

Instruction (1) of the adult.

Instruction (2) of the adolescent.

Instruction (3) of the child.

The *first* division is the one of immediate importance to present needs. We have few or no qualified teachers. These must necessarily come from the adult class.

The *second* is the division of consequence to the crowding future. In the case of the adolescent it may not yet be too late to accomplish good for his own health and that of his children.

The *third* comprises the great field of promise for the ultimate future. It furnishes the only truly encouraging beacon, heralding an oncoming day of genuine public health. It centers in and around the sane and simple instruction of the child in normal sex hygiene and in all the sociologic outgrowths of that science.

Main Lessons.

There are three basal principles upon which all effective instruction in sex hygiene will rest.

1. The absolute dependence of future health upon present health and hygiene, especially upon sex hygiene in its bearing upon heredity.

2. The responsibility of the individual for his or her influence upon the public health of the future.

3. The possibility of correcting and even of eradicating a certain measure of the unhealth and unhygiene of the past by the sex hygiene of the present and future.

Based upon the foregoing principles even human eugenics acquires a significance that has in it something real, rather than of fancy. A prominent western educator has recently (according to the daily journals) demanded the return of the "old, unintelligent love marriage." As though there could not be just as rationally and just as naturally a love marriage, old-fashioned as we would have it, but backed and preceded by intelligent knowledge on the part of the marrying individuals, the one of the other,—such a knowledge as will preclude the blind love that ends in disaster! Neither man nor woman will love that which is unhealthy or unclean, provided they know before he or she loves! Love has been blind, and, therefore, very often unhappy! Educate the woman and the child and love will be wide awake in one respect, at least, namely, in assuring itself that it is not choosing to marry transmissible, vicious tendencies or disease itself.

The Order of Progression.

There must be a distinct and definite method and order in the march toward the education of the present and future public in sex hygiene if results are to be speedily attained.

First, it has already become very apparent that it is necessary to hold back and restrain the overenthusiastic (usually the untrained), the improvident, the injudicious, the ignorant, and those of shallow interest whose ardor is soon to be throttled by the thorns of difficulty and impatience.

Second, I have already mentioned the direful lack of trained, and naturally fitted teachers of sex hygiene. There must straightway be reared (because they cannot be manufactured) a body of men and women essentially lovers of children, deliberately trained for the work, and ready to sacrifice much for the good they will accomplish. They should be prima-

rily, and some day will be, fathers and mothers, and the teaching will then be done mainly in the home. Today the fathers and mothers appear to be of all the most unwilling and, therefore, the least qualified to teach. Therefore, for a time at least, the teaching which the parents refuse to and cannot do must be supplied by the already overburdened schools, and it is with respect to this latter phase of sex hygiene instruction, namely, that in the schools, that I wish to venture a few suggestions by way of stimulating thought and discussion.

Sex Hygiene Teaching in the Schools.

In the use of the word schools let us not limit our reference to the public school system. A vast number of children leave the public schools for work at fourteen years or thereabouts, and see no more of its benefits. Many children of the more affluent classes enjoy only private and boarding school experience, the latter of which I consider very often a curse. Both classes come in touch at some time with the Sunday School. All three, public, private, and Sunday School (Sunday or weekday classes), offer opportunities of reaching the child from some vantage ground, and all three should be employed to their full limit of effectiveness and peculiar advantage. Here at once becomes pressing the lack of suitable teachers, and here again we cry "O for the home and the parent!" It is only the rare public or private school teacher that can instruct and love a child at the same time; and the combination appears to be absolutely necessary!

The Teaching of Little Children.

I venture to repeat my belief that the teaching of sex hygiene to children, little or grown, must be through and by means of a union and amalgamation of knowledge, personal magnetism, and love, or there had better be no teaching. Next, I am impelled to say that which would seem axiomatic, to wit, only normal sex hygiene should be taught to children. One of the main stumbling blocks in the way of a ready acknowledgment of the need for teaching on the part of parents and pedagogues is the misconception that those who are most earnest and have studied the subject longest and most thoroughly have desired or planned any other arrangement. If tactful teaching is to be begun in the home, it can best be started in answer to the first abrupt questions of the little toddler, boy or girl, as to the origin of his or her own, or a new baby's existence, or as to that of the pet kitten or puppy newly arrived upon the scene. At a very early age flower teaching can be begun.

To my mind there are three very simple, all important lessons for the child to see, and, through seeing, to learn. First, the absolute dependence of the offspring for its own possessions upon the nature and character of the parent. Second, the neverending responsibility of the male and female

for the reproduced type and qualities—*always reproduced*—in the progeny. And, third, the thought, easily instilled from very young childhood, that far in the distance, may be, but somewhere ahead is the possibility of fatherhood or motherhood as the real incentive for a hygiene and health to be maintained in the embryo parent of today. There must be no teaching as such! At least the child must recognize no word or move of the parent or teacher-friend as deliberate instruction. The relation of teacher and taught is incompatible with time comradeship!

The love of a doll or of a pet animal will very early show the parental instinct maturing in the very young. It requires, as a rule, little encouragement and direction to lead the child to understand how important its example and influence are to the foreglimpse of the boy and girl of a future home. Outdoors and indoors, there are opportunities furnished the observant parent that should be seized upon and put to good use in opening the eyes of the young child to a knowledge of the development of nature. It may be that very early the question will be put in its totality, "Mother, where did I come from?" Very shortsighted, and very, very timorous is the mother who fails to win to herself, through the beauty of the true story, the boy or girl snuggling in confidence against her bosom. Her reply cements finally either the comradeship or the distrust that is to exist between the child and her. Up to this point, the child is, of course, doubly fortunate that has the advantage of the sunshine and the fields, and the love and the personal touch, and the brooding concern of the mother, for his early schoolroom and curriculum, and teacher.

Teaching the School Child.

During eight or ten or twelve years of their lives the boy and girl are in school. Six or four or two precious years are all that are furnished to some by our manner of present day living. Many of the children come from surroundings and examples of domestic unhygiene that must be very tactfully untaught and unlearned daily, at the same time that their influence is being replaced and counteracted by the right thoughts and accurate bits of scientific interest that help in fastening and driving home the facts of sex hygiene.

At the eighth year, children of both sexes can be and are being taught the science of reproduction in flowers, and insects, and birds, and fishes, and the lower animals. Not a lesson is assigned other than those which go in through the eyes, with only an occasional suggestion through the ear. Again no thought of a teacher, of being taught! No knowledge that any studying is being done! And by and by a verbal review of the ground covered by the tiny naturalist student of sex hygiene! The main thing learned at this age is a hint at the influence of the male and female in heredity, the responsibility of the parent, if a weak, unhealthy offspring is born.

At eleven or twelve years, the boy and girl are at the threshold of puberty. In the last three years bit by bit has been added to the eight-year-old beginning. Many of the sex habits of the plants and animals are known; many of the resemblances of plant and animal habits to human ways and methods have been noted, even if not commented upon. Certainly at the beginning of the twelfth year and perhaps a year before, there should be explained to the girl the phenomena and the purposes of menstruation, and to the boy the significance of sex awakening, sex feeling, and the seminal emission. From now on, of course, much of the gradual, quiet instruction must necessarily be in classes made up of only one sex. Moreover, the teacher should from now on be of the same sex as the pupil. Even in biology and anatomy, I think the boys and girls are better instructed in separate classes. The ideal method would be to work and play with classes of one or two. The next best thing is the smallest possible class, even if it be larger than one would choose. The larger the number of children, boys or girls, the more necessary an abiding, deep, personal interest in each one on the part of the class leader and the more essential his or her personal magnetic hold on the class. The larger the class, therefore, the greater the necessity for a truly capable teacher!

During this period personal hygiene, with special relation to the future home, holds a prominent place in the subject matter to be taught. The sex organs and their functions can easily be dealt with from the standpoint of the public health. The dangers involved in their abuse should be mentioned, but should never form a matter of lengthy or agonized discussion. Constructive rather than punitive teaching is here the order of the day!

At this age can also be taught the ground principles of the hygiene of food and digestion, exercise and play, of the influence of cold as opposed to bodily warmth, of drugs (opium, tobacco, cocaine, alcohol, tea, coffee), all in their relation to sex health and sex control and heredity as it will be evolved in the future child. Such a procedure as the Mayor and Commissioner of Parks placarding a city against alcohol for the public welfare, as in Cambridge, will appeal mightily to the growing sense of citizenship in the child!

At sixteen years the average boy requires, and the girl ought to have full teaching, not only regarding biology, animal breeding, human eugenics, and sex hygiene, especially in its new and rational form relating to individual chastity and the single standard of moral and physical health for the two sexes. The existence and the source of the social diseases must be known, also their ubiquity, and their intimate relation to sex irregularities and misdoing. I have known many boys and even girls of fifteen years who were old in sex depravity at that tender age. The girl, to my mind, requires teaching just as early, just as ample, and accurate, and intelligent.

If she is to avoid an unfortunate choice of friends and finally of her life-mate, it will only be because of her clear understanding of the fact that there are clean and also unclean men, and that a scrutiny of the life record is the best method of distinguishing. Few girls of the future will, I think, deliberately choose a "man with a past" (as the saying goes), because that will mean also taking to her bosom and into the life of her child physical disease.

Both the boy and girl should be taught the simple facts regarding the sex life of one another. Thus the girl cannot fail to be ennobled in the estimation of the boy by his clear comprehension of all it cost his mother to give him life! A boy often becomes truly reverent toward a girl after he has had explained to him the significance of her monthly promise of motherhood! In the same manner the girl should understand much of the sex physiology of the boy! It is due her that she should know clearly the nature of the semen, its vitally important and dangerously vital contents, and the likelihood of maternity should the sex advances be tolerated that are so frequently regarded as permissible, at least under promise of marriage, and all too frequently without even that flimsy safeguard. She should not be allowed to enter wedlock either a frightened, uninformed child, or a brazen woman who has lost all modesty and with it the wife's dearest charm.

At the seventeenth year, and from then onward, more and more can be imparted to both sexes of the sociologic relations of normal sex hygiene, heredity, eugenics, prostitution, and the social diseases. All of these should be studied from the viewpoint of the young citizen! Both the boy and girl can at a far earlier age than sixteen and seventeen appreciate and prize their public influence! It is because they are entrusted with helpful knowledge too late that so many of them outgrow the ability to realize that they have any responsibility except to the selfishness of their own passions!

Just a closing word with respect to the

Teaching of Adults.

Many are more ignorant and all are more prudish and, therefore, more difficult to instruct, than children. Very frequently with them it becomes necessary to reverse the order of procedure, to teach them backward, as the children would say. Oftentimes they must first be instructed in the more repelling facts of sociology, bad housing conditions, prostitution, the social diseases, in order to demonstrate to them the necessity for attention on their own part and for the teaching of normal sex hygiene to their children.

Thus the social diseases have served as a means to an end, and have been literally providential! Nothing else would have succeeded as an

entering wedge! Certain students are apparently creating for themselves the dread of a bugaboo in the form of a fear that unwarranted emphasis may be laid upon these diseases that spring from the shaming of woman by mankind. They need, however, have no concern on this score! I know of no honest and intelligent worker who is using the facts and statistics relating to syphilis and gonococcus disease as more than a lever, to lighten the load. Soon other implements will be more serviceable in this particular field. Certain it is, however, that these diseases of immorality, which choose seemingly by preference the innocent, are the great, crying problems of the day! They are annually costing the nation many lives, mainly from among our women and children, rich and poor. On their eradication more than upon any other one influence depends the ultimate safety and the sex integrity, as well as the general health, of the American public!

But whether it be by this method or by that, whether an adult or a child be the object of our solicitude and care, the goal is the same! We are trying to reconstruct our country into a land of homes. We are fast losing, if we have not already lost, the right to the old characterization, the land of the free! Our women and children are not free! We must regain that cherished title, and in order to succeed we must redeem ourselves before our own consciences by first placing woman where she belongs on a plane of social and moral and political equality with man; then, by granting to the child its freeborn right to life and health; and, finally, by digging again the old wells which our fathers digged, by restoring the family altar, and through it the home.

I have not attempted to suggest a text-book because I am convinced that none should be used during school days. There are helpful books for the instruction of the teacher, but the pupil (at least the young pupil) neither needs, nor is himself in the presence of, the printed page. Moreover I have never seen a book on sex hygiene that I would place in the hands of the boy or girl! Sex hygiene must be taught in all its steps and phases by a splendid type of man or woman, and with his or her eye fixed in a deep interest upon the answering look of the child. If this be impossible, something has gone awry, and there had better be no further teaching! Sex hygiene taught to boys and girls in the dark (as with lantern demonstrations), sex hygiene read from the printed or written page, sex hygiene taught in any other way than by direct word of mouth, is likely to work harm and should not be ventured.

We are treading new but fertile ground! Each new pedagogue will press out his or her own path through the growing grain. I have merely endeavored to offer a few general suggestions that may serve to inspire some to essay the attempt to teach, and restrain others from the experiment. If every one who enters upon the work will but half appreciate the privilege

and responsibility that center in and grow from the sex training of the endless life-chain that begins in one boy or girl, then I am sure he and she will have caught the keynote of the most absorbing harmony life has ever assigned as a task for the teacher-student to evolve. There is something uncanny and discordant in the individual that fails to leap toward the opportunity to construct loyal parents and citizens out of children!

Moreover, this is the chief end of sex hygiene!

A PROTEST AGAINST THE 37° C REQUIREMENT FOR BACTERIAL COUNTS.

H. W. HILL, M. B., M. D., D. P. H.

Director, Institute of Public Health, London, Ontario.

Read before the Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

Whatever other objections may be raised by other workers to that item of the standard methods of water analysis of the American Public Health Association relating to the incubation of bacterial plates for bacterial counts, one very decided objection must necessarily come from those who conduct sanitary investigations of water supplies at any considerable distance from the headquarters' laboratory.

In almost all our large states and provinces the state or provincial board of health is frequently called upon to investigate sources of water supply, suspected of carrying typhoid or dysentery, at points 100 to 300 miles distant from headquarters. Such investigations often require bacterial counts as one item. It is not practical to carry a reliable incubator on such a journey unless the investigation requires a long continued stay in the affected community.

The majority of such investigations do not require more than one or two days of time. During this time it is perfectly practical to collect the water samples needed and to plate them at once, taking for this purpose a travelling laboratory outfit (exclusive of an incubator); but it is necessary then to ship these plates to headquarters for incubation and counting, while the field investigator is left free to go on to some other place.

It would not be a practical thing to ship these samples to headquarters without plating them first, even though shipped upon ice, for the period of transit is frequently twenty-four, forty-eight or more hours, and in time far short of that samples even on ice would spoil.

BACTERIAL COUNTS.

It is quite evident then that should 37° C. be required for standard incubation, there is no practical way whatever to secure such incubation under the conditions outlined. It is true that 37° incubation might be given to the plates after their receipt at headquarters, but in the meantime during transit for twenty-four, forty-eight or more hours the plates have received incubation already at what may be called roughly "room temperature." Hence if these plates are again incubated at 37° the counts

obtained would be an unreliable mixture due to the two incubations received by each plate.

Using a room temperature standard and four days as the incubation time limit, plates made at any one hour must go ninety-six hours before being counted. During this ninety-six hours, the plates may be in transit without injury, for during transit they receive approximately room temperature incubation both summer and winter.

I appreciate fully the reasons why filter check tests are desired at 37°, and also that the reasons which make this temperature proper for milk tests are also the reasons which make it proper for filter tests, because both for milk tests and filter tests the samples are taken within short shipping distance of the headquarters laboratory; and since for both forms of examination a series of tests are required, it is worth while, for both filter tests and milk tests, to set up a laboratory temporarily, if need be, at a distance from headquarters. I would fully agree to a 37° standard for both of these forms of examination but I must protest very strongly against the prescription of the same standard for field work on raw water, nor do I see that in making this distinction there is any departure from the principles back of the desire for uniform measures. The bacterial count on a filter is made for quite different purposes from those which call for the bacterial tests of raw water. There is much to be gained in having the tests on all filters comparable with each other. There is much to be gained in having the tests on all raw waters comparable with each other. *There is very little to be gained in having the tests on all raw waters comparable with the tests on all filters.* The filter itself is far too variable a factor to make the extra exertion worth while. I would propose that a straight 37° standard be adopted for both raw and filtered water in filter tests, but that for all other purposes the room temperature should be established.

Someone is sure to suggest that both temperatures be made standard for both purposes, but this would mean unnecessary duplication of plates and, moreover, could not be lived up to by the field worker as above described. His difficulty is to secure 37° at all; for him the room temperature standard is, practically speaking, the only one.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

A quarterly meeting of the Massachusetts Association of Boards of Health was held at Boston, April 30, under the presidency of Mr. James C. Coffey.

The following applicants were elected members of the Association: William Hitchcock of Palmer Board of Health; Charles S. Knight, M. D., of the Westboro Board of Health; Henry Nelson Sperry of the North Attleboro Board of Health; Charles S. Spencer, M. D., of the Concord Board of Health; Granville W. Hallett of Osterville, of the Barnstable Board of Health; H. Hamblen, M. D., of the Maynard Board of Health; Edward G. Birge, M. D., of Allston; Napoleon Levesque of the Salem Board of Health; Carleton A. Rowe, M. D., of East Milton, of the Milton Board of Health.

The Executive Committee also recommended for adoption the following resolution covering the anti-vaccination bill which has passed the Senate and is now in the House of Representatives:

Resolved, That the Massachusetts Association of Boards of Health, in its quarterly meeting assembled in Boston, April 30, 1914, has learned with deep regret of a proposed change in our public health laws to allow children to attend public school without vaccination. It would in a few years prove a most regrettable step backward in the progress of public medicine, and has the unqualified disapproval of this Association.

The resolution was adopted unanimously.

REPORT OF LEGISLATIVE COMMITTEE.

To the Massachusetts Association of Boards of Health:

Your Committee upon Legislation begs leave to submit the following as a Report of Progress:

Your Committee has followed all of the bills which have been referred to the committees upon public health, social welfare and agriculture, which include about 325 in all. From this number your Committee selected 80, which appeared to have direct bearing upon public health, and to be of interest to your Association. Your Committee has made a careful study of this group of bills, and has appeared before the committees at the State House, favoring such of them as seemed to be wise legislation, and opposing those which seemed to be unwise where it appeared necessary to do so.

In view of the fact that there were no bills, in favor of which the Association had taken an active stand, your Committee has, since the close of the hearings, pursued a policy of "watchful waiting," following the reports of the committees as they have been made. Up to this time there has been no legislation enacted which seriously affects boards of health of cities and towns.

There has been reported to the House, and passed by that body, a bill known as "House No. 2156," which extends the present jurisdiction of boards of health over food exposed for sale, to include milk. This bill was placed upon the table in the Senate on March 5, and is still there, presumably awaiting reports of other milk bills.

House No. 1018 allows children of parents who do not believe in vaccination to attend schools without being vaccinated. This bill has passed the Senate and is pending in the House. That is the bill concerning which the Association has just taken action.

There have been a great number of bills before the legislature dealing with the inspection and sale of milk. Most of these bills have been given reports of leave to withdraw, which reports have been accepted.

There is still before the Committee on Agriculture, Senate Bill No. 234 on Inspection of Dairies and Barns, which is commonly referred to as the "Walker Bill." At the hearing your Committee appeared to oppose this bill, as, in the form in which it was introduced, it seriously affected the powers of the boards of health of cities and towns. The petitioners agreed that the bill should be so changed as not to affect the powers of boards of health, and it was agreed by the Committee that, if any bill was reported, it should leave the powers of boards of health of cities and towns as they now are.

House Bill No. 936 for the protection of public health and promotion of milk industry known as the "Milk Consumers' Association Bill," or as the "Ellis Bill," and House Bill No. 775 to provide for a state milk regulation board, known as the "Bigelow Bill," are still before the Committees on Agriculture, and Public Health, sitting jointly. In reference to these bills your Committee has taken no definite stand either for or against, but has devoted its energies to having a provision that the present authority of boards of health shall not be affected included in any bill which may be reported.

There have been many bills to reorganize the State Board of Health, most of which are still before the Committee on Public Health. Your Committee has taken no action in reference to these bills.

Under authority of the vote of this Association your Committee has retained Amos T. Saunders of Clinton as legislative counsel. He has assisted your Committee in following the different bills, and has appeared at the hearings.

GEORGE L. TOBEY,
Chairman.

The report of the committee was adopted.

MR. THOMAS JORDAN: I would like to call the attention of the committee to a bill which is now before the legislature and which was reported originally as House Bill No. 1972 in the House, in regard to the occupation of cellars and basements in the city of Boston. The bill was a very drastic bill as originally presented, and would have prevented the occupation of any cellar or basement in the city of Boston. As the representative of the Boston Board of Health, I appeared before the committee at the State House in opposition to the bill as it was drawn, and the petitioners and myself were requested by the chairman of the committee to get together—the bill was offered by the Women's Municipal League of Boston—and we finally did get together and the bill was presented which is called Senate Bill No. 552. I would like to call the attention of the committee to that bill. I think it is a good bill, and I think it ought to pass, and anything that the committee can do to further the passage of that bill I would like to see done. There is no question but what there are a number of basements and cellars to which it would apply. The definition of a cellar in Boston is entirely different from what it is in any other city or town in the state. Outside of Boston the definition of a cellar is from the level of the adjoining ground. In Boston the definition of a cellar is from the curb of the street. That was my objection to the bill. There is not any question but that all over the city of Boston there are perfectly good rooms to live in, sleep in, especially in the Back Bay district, where these large apartment houses are built with the grade running back. The rooms, some of them, have 11 feet and 11½ feet stud, with good yard room, a wide passageway at the rear, plenty of sunlight and plenty of air. Still, if that bill, as originally presented, went through, it would be an utter impossibility to occupy those rooms. But the

bill as amended and as presented now before the Senate I should like very much to see put through. If there is anything that the committee can do, or if there is anything that the Association can do to further the passage of that bill, I would like to see it done.

Dr. William J. Gallivan moved that the report of the Committee upon Period of Isolation and Exclusion from School in Cases of Communicable Disease be adopted. The motion was seconded.

THE PRESIDENT: I don't think this commits us to anything, except that we have a body of competent men who are experts in their line who have said this is the ideal thing, and we ought to work as near to it as we possibly can. There is not anything binding on any board of health at all.

MR. WILLIAM G. KIRSCHBAUM (New Bedford): Mr. President, do I understand that in adopting this report the boards of health assume to control the school attendance?

MR. KIRSCHBAUM: What I am coming at is this. The attendance at school is already covered by law. Chapter 44, section 6, says:

"A child who is a member of a household in which a person is ill with smallpox, diphtheria, scarlet fever or measles, or of a household exposed to such contagion from another household as aforesaid, shall not attend any public school during such illness or until the teacher of the school has been furnished with a certificate," etc. It seems to me, Mr. President, that if we are going to do anything we want to do it legally. I am heartily in favor of this report. I think chapter 44, and its amendment governing school attendance is entirely in the hands of the school committees of Massachusetts. It is drastic. The report by this committee is far more pleasing to me. It would be easier to work with it. But I think when we go to work under these recommendations we ought to go to work and do it legally, and these measures should be incorporated in a bill to take the place of section 6 of chapter 44, and its amendment of 1906.

THE PRESIDENT: I don't think there is anything in this which allows a child to go to school as a member of a household in which any of these diseases exist.

MR. KIRSCHBAUM: You would find it would be vastly different to work under that. You are working right against the law which I have quoted.

DR. CURTIS: Would the gentleman read the whole of that section, please? "Except"; you say "except." What is the exception?

MR. KIRSCHBAUM: The first part of the section deals with vaccination of school children, and then, beginning with 1902, as Doctor Durgin says, they had two or three amendments. One was that a child could go to school without being vaccinated if it was not a fit subject to be vaccinated. Then the section goes on and says:

"A child who is a member of a household in which a person is ill with smallpox, diphtheria, scarlet fever or measles, or of a household exposed to such contagion from another household as aforesaid, shall not attend any public school during such illness or until the teacher of the school has been furnished with a certificate from the board of health of the city or town, or from the attending physician of such person, stating that, in a case of smallpox, diphtheria or scarlet fever at least two weeks, and in a case of measles, at least three days, have elapsed since the recovery, removal or death of such person."

My idea is that our legislative committee ought to see that such a recommendation as we have got is embodied in a law which will take the place of that, and then we will go at it right.

THE PRESIDENT: As a matter of fact, as I have said, this report does not bind anybody. It is simply the recommendation of these gentlemen, who are experts on this particular line. They simply recommend to the Association the adoption of these provisions as the belief of the Association. There is no binding force, or it does not in any way interfere with the law.

MR. KIRSCHBAUM: I appreciate that, but supposing we should go ahead and talk with our school board in line with this. The school boards are running the schools; they cannot do any different than what the law prescribes, as far as household exposure is concerned.

DR. GALLIVAN: Mr. Chairman, it seems as if this would be the necessary preliminary step to take, to adopt the recommendations of this report. This is more recent. The legislation quoted perhaps is archaic, and the first step to take, if these recommendations meet with the endorsement of the members here present, is to adopt them, and then legislative action might be based upon the recommendations of this report.

DR. THOMPSON: It seems to me that this report is a little disappointing; it is to me and I think it is to other members of local boards of health, from the fact that no ground is taken in regard to the matter of fumigation by formaldehyde gas. They recommend disinfection by boiling articles infected and by scrubbing woodwork and furniture. It is all right as far as it goes. The question is whether this society will give its support to local boards of health who wish to do away, many, many times, with the matter of fumigation by formaldehyde gas. It seems to me this committee would have done us a favor if they had given us an expression of opinion in regard to that one way or the other, and it seems to me a good thing for this society to take some action in regard to that matter.

DR. GALLIVAN: I perhaps might say that, inasmuch as we did not refer to it, it might be inferred that we did not believe in fumigation by formaldehyde. We consider it an unnecessary expense and a waste of money. We might have put that in our report; but I suppose the report cannot be complete in every respect, and the fact that it has been omitted might lead you to infer that the committee took that position on it.

DR. THOMPSON: I wish they had said so, gentlemen. It would have given us more authority.

DR. THOMPSON: If you get an expression of this Association that is satisfactory to me; I don't care whether it is in print in this report or not, if this Association will pass resolutions to that effect. I presume other local boards of health would take the same position. If we have the authority of this Massachusetts Association of Boards of Health to say that they are behind us, then the public won't find so much fault with us if we give up fumigation by formaldehyde gas. That is my point.

THE PRESIDENT: The gist of the talk is that we place ourselves on record as being opposed to formaldehyde disinfection.

DR. GALLIVAN: I think the committee would unanimously accept that recommendation. To incorporate it in this report under the various headings is going to be quite a matter of detail, and I think action on the matter by this Association might take the form of a separate resolution. I should be very glad to vote for it as a separate resolution.

DR. MORROW: It seems to me that the fact that this was left out of the report is sufficient to show that the committee disapproves it, and I don't see why we should vote upon it. If it is left out that drops it; there is nothing more to be done.

THE PRESIDENT: Amending this report by inserting what is proposed would entail, as Doctor Gallivan has intimated, quite a large expense, because it would have to be added to each and every one of these various diseases. The fact that they have reported, as he says, on the proper means of disinfection in their opinion, and have left that out, would infer that it was not approved by them.

DR. THOMPSON: The point is, it looks as though the committee was dodging the question.

DR. CURTIS: Mr. President, I move that it is the sense of the committee and of this Association that disinfection by formaldehyde gas is useless.

(The motion was seconded.)

MR. BOLLING: I don't think we ought to specify formaldehyde gas. It looks as though we were out against that by itself. There are other forms of gaseous disinfection, sulphur fumigation for instance, and considering the difficulty of securing thorough disinfection with sulphur and also the damage to which house furnishings are liable by this method, it seems to me that most boards of health would not secure effective results from its use. So why not say aerial disinfection?

DR. CURTIS: I will accept an amendment to that effect, that gaseous disinfection is useless.

THE PRESIDENT: The motion is that the Association place itself on record as being opposed to gaseous disinfection.

DR. DURGIN: I think that we are getting a little bit careless in this matter. I should not take the position that all gaseous agents were not capable of disinfecting. I think the best examinations made the world over have shown to the contrary, in practice and in the laboratory. I doubt if we are doing the right thing by taking one after another of the gaseous agents and totally condemning them. It is more than the department at Washington has done, and more than we should do. So far as the formaldehyde is concerned, it is perfectly well known in scientific quarters that it is a feeble surface disinfectant, and nothing more, and is not a reliable agent for us to use practically in fighting infectious diseases. When it comes to the other agent which has been named, sulphur, when used properly it is capable of being not only a cheap but a perfectly effectual disinfectant.

DR. CURTIS: Mr. Chairman, can I modify my motion and say gaseous disinfection as practised by the average board of health?

The motion of Doctor Curtis was lost.

Doctor Gallivan's original motion, accepting the report and adopting its recommendations, was then passed.

The following papers were then read:

The Single Tax in Relation to Public Health, Lewis Jerome Johnson.

Flies and Filth, Samuel Miller.

Wakefield and Stoneham Epidemic of Septic Sore Throat, Dr. F. L. Morse.

(The above papers will be found in this issue of the JOURNAL.)

On motion the Association adjourned.

BOOK REVIEWS.

Communicable Diseases: *An Analysis of the Laws and Regulations for the Control Thereof in Force in the United States.* By J. W. Kerr, Assistant Surgeon General and A. A. Moll, A. B. Prepared by direction of the Surgeon General and published as Public Health Bulletin No. 62 by the United States Public Health Service. 699 pages including table of contents and index. Government Printing Office, 1914, 50c.

This volume is intended as a sequel to Public Health Bulletin No. 54, which was an analysis of the laws concerning organizations, powers, and duties of boards of health and, like its predecessor, is an extremely valuable and practical publication. The first six pages after the table of contents serve as a general introduction and discuss the general basis of legislation regarding communicable disease and the respective duties of federal, state, and local authorities, and of physicians and citizens in the suppression of disease, making an interesting and instructive summary.

In the next section of the bulletin seventeen pages are devoted to a general discussion of the history and scope of federal laws; one

hundred and thirty-three pages take up the state laws in the same way, summarizing first the general subject matter of the laws and following with a brief summary of penalties and methods of prosecution. An appendix to this section includes ninety-three pages of the text of court decisions on various subjects both in federal law and under the laws of the states.

The greater part of the book, pages 262 to 667, is devoted to the text of the "federal, state, and territorial laws relating to the control of communicable diseases, enacted before July 1, 1913." This bulletin is without any parallel in the field which it covers and is well worth having.

E. A. Ingham.

Proceedings of the Thirty-third Annual Convention of the American Water Works Association held at Minneapolis, Minn., June 23-27, 1913: *Published by the Association.*

This volume comprises 706 pages of original papers and discussion. The papers cover a wide range of subjects of general interest to water works men.

The general question of valuation and rate making constitutes an important section of the volume and is represented in four papers, one on Valuation, by Henry DeForest Baldwin, one on Rates Under the Wisconsin Law, by Halford Erickson, and two on Private Fire Protection Charges, by W. E. Miller and Leonard Metcalf, respectively. A paper of a similar nature but involving questions of pollution as well as fire protection was read by the President, Mr. Robert J. Thomas, and describes the pollution of the Lowell (Mass.) water mains through the failure of a check valve separating the city system from the unprotected and polluted fire protection system. This paper elicited a full discussion

in the course of which several similar instances were brought to light.

Other sanitary problems were developed in papers and subsequent discussions by William F. Wells, on the Use of Alum in Connection with Slow Sand Filtration at Washington; by Nicholas F. Hill, Jr., on Modern Filtration Practice; by George A. Johnson, on Pure and Wholesome Water; by Fred A. Stover, on Micro-Organism Troubles in the Operation of Mechanical Filters; by Frank LaF. Anders, on the Water Purification Plant at Fargo, N. D.; by Francis F. Longley, on the Toronto Filters, and by W. N. Jones, on the Minneapolis Filter Plant.

The Use of Liquid Chlorine for Sterilizing Water was described by John A. Kienle. Other papers of special interest to public health workers were read by J. Walter Ackerman describing the interesting experiments

recently made on Owasco Lake, N. Y., on the relation between surface water movement in a lake and the wind movement above the water; by H. F. Dunham, on Support and Aid to Health Officers, and by James M.

Caird, on the Bacteria Count on Gelatine and Agar and Its Value in Controlling the Operation of Water Purification Plants.

Earle B. Phelps.

The Social Emergency: Studies in Sex Hygiene and Morals. Edited by William Trufant Foster. Introduction by Charles W. Eliot. Houghton Mifflin Co., Boston, \$1.35.

The "social emergency" is the fact that the movement for publicity in matters of the hygiene of sex threatens to become a stampe before expert agencies are developed for properly controlling its direction and momentum. In the absence of such control, frothy emotionalism, failure to grasp more than a few of the aspects of the movement, and the machinations of vice commercializers may subvert the purpose of the movement—may work tremendous harm.

This book, then, aims to assist in educating, largely from the teaching profession, a body of workers trained to meet this supremely important situation. Teachers and social workers who are temperamentally qualified for imparting the truths of sex, may take it as an important addition to their library on the subject. It is a brief but lucid, convincing, and practical exposition of the manifold aspects of what is usually termed "sex hygiene."

Chapters I and II on "The Social Emergency" and "Various Phases of the Question" are written by President Foster; Chap-

ter III, "Physiological Aspects," by William House, M. D.; Chapter IV, "Medical Phases," by Andrew C. Smith, M. D.; Chapter V, "Economic Phases," by Arthur E. Wood; Chapter VI, "Recreational Phases," by Lebert H. Weir; Chapter VII, "Educational Phases," by Edward O. Sisson; Chapter VIII, "Teaching Phases: for Children," by William G. Eliot; Chapter IX, "Teaching Phases: for Boys," by Harry H. Moore; Chapter X, "Teaching Phases: for Girls," by Bertha Stuart; Chapter XI, "Moral and Religious Phases," by Norman F. Coleman; Chapter XII, "Agencies, Methods, Materials, and Ideals," by President Foster. A valuable bibliography and index follow:

It would be almost presumptuous to commend this timely and important book. Its high ideal, plain-spoken, practical ideas, scope, and effective style will make it of real service in helping to create the type of teacher competent to instruct in the meaning of sex, and to meet the "social emergency."

E. C. Howe.

Transactions of the Fourth Annual Meeting of the American Association for Study and Prevention of Infant Mortality. Washington, D. C., November 14-17, 1913, 1211 Cathedral Street, Baltimore, Md.

Nothing better illustrates the growing interest in public health questions than the development of nationally organized efforts to prevent certain diseases. The anti-tuberculosis campaign was the earliest and is the largest example of this. The campaign to prevent infant mortality has followed on its heels, and babies' clinics, milk stations, and preventive nursing services have sprung up under public or private auspices in nearly half the states of the Union. The American Association for the Study and Prevention of Infant Mortality represents the national

organization of this movement, now including eighty-five local affiliated societies and about 800 members.

The Proceedings of the Fourth Annual Meeting of the Association, held last November in Washington, D. C., give a cross-section of this campaign. The volume of nearly 450 pages contains a number of important contributions. The elaborate presidential address of Dr. L. Emmet Holt surveys the remarkable changes in the public point of view on infant mortality, from the days when those infants who as Doctor Holt says,

being unfortunate though not necessarily unfit, were exposed to die, to the earnest efforts of the twentieth century to obtain new knowledge and apply old knowledge for the prevention of all unnecessary infant deaths.

The paper of Dr. J. W. Scheresschewsky on "Heat and Infant Mortality" summarizes with great care the most recent work on the subject, leading to the conclusion that high indoor temperatures are a direct cause of summer mortality of infants, and that "the action of dirty and stale milk in causing infantile deaths in summer has been given a significance which has overshadowed other factors of equal or greater importance.

Doctor Scheresschewsky's constructive conclusions are of so much importance in the practical guidance of the work of boards of health and other agencies in the prevention of infant mortality that they may be quoted:

"As a result, future activities for the prevention of infant mortality must concentrate themselves to a greater extent on the question of housing, and especially factors productive of high indoor temperatures, such as over-crowding, narrow streets, and the absence of thorough ventilation.

"Poor housing conditions can be partially neutralized by the proper care of babies in

the summer. The general public should be educated as to the importance of high indoor temperatures in causing deaths of infants, and especially as to measures which prevent babies from suffering from the heat.

"Breast feeding must still be regarded as a most, if not *the* most important preventive of the summer death of infants."

Space does not permit more than mention of valuable papers relating to the technical standards for public health nurses who specialize in infant welfare work; the new work of rural nursing now under development by the National Red Cross—a public health movement which in itself is of great significance; the technique of obstetrical services and their effect upon infant mortality; "Courses in Motherhood for Young Women"; and the need of improved vital statistics as the guiding compass for those who have the responsibility of steering this bark of public health.

All physicians, especially those in whose communities no local work has yet been organized for the prevention of unnecessary infant deaths, will do well to examine this volume. It is of equal value to non-medical persons who care for the public health, for babies are a common denominator of interest.

M. M. Davis, Jr.

HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS

Elmira, New York.

Dr. F. B. Parke, health officer of Elmira, N. Y., presents the annual report of the Board of Health for 1913. Elmira is a city of 37,664 people and, in 1913, had a crude death-rate of 15.6. The birth-rate was 19.5, and the infant mortality rate 102 per thousand births. The communicable disease situation seems rather unsatisfactory. Measles, chicken-pox, diphtheria, scarlet fever, typhoid, and smallpox totalled 690 cases during the year, chicken-pox having 100 of these and smallpox, 34. Typhoid claims only thirty-nine cases among residents, eight of

them being traced to a milk-borne infection.

The Health Department employs six inspectors of various kinds as well as a health officer and a bacteriologist, and the larger part of the report is devoted to a rather detailed tabular statement of the work of the inspectors. The report is unfortunately brief and might be made much more complete and valuable by a better selection of tables. Among the most evident deficiencies are the classification of deaths by causes and the financial statement for the year.

Spokane, Washington.

The report of the Department of Health and Sanitation of the City of Spokane for 1913 is wholly statistical. The statistics are excellently chosen and arranged far better than those in the average report, but it is doubtful whether a purely statistical report is bringing in the best possible returns on the investment. However clear a tabulated statement may be it may be simplified, emphasized, and made more attractive to the average reader by an accompanying statement or summary in writing. It should be remembered that from a standpoint of practical returns the value of a health report consists not so much in its use for reference and record as in its use for the education of the public; if not in general sanitary subjects, at least to an understanding of the work of their health authorities and a consequent spirit of appreciation and coöperation.

The financial statement shows about seventeen cents per capita spent on strict health work and seven cents additional on the iso-

lation hospital. In the mortality report the international system of classification is used and the monthly totals given. Spokane has an estimated population of 128,327 and a death-rate of 8.88. The birth-rate is not given but on the same basis would be 16.6, the low figure possibly indicating incomplete registration or a high estimate of population. The infant mortality rate is 74.1. A graphic chart of the causes of death shows organic diseases of the heart and tuberculosis well in the lead, with cancer and pneumonia next. Another table which is out of the ordinary for a health report is a classification of deaths according to occupation, though unfortunately it does not divide by causes of death.

The greatest number of cases of contagious disease is held by smallpox with 368. Measles stands second with chicken-pox a close third. Other reports are of restaurant inspection, meat and market inspection, sanitary inspection, and dairy inspection.

Williamsport, Pennsylvania.

The Board of Health of Williamsport, Pa., submits its customary annual report to the mayor and council of the city for the year of 1913. The report is an improvement over that of 1912 and in the opinion of the board shows an improvement in the health of the city.

The first two pages are devoted to the statistics of the local weather conditions for 1913, a feature that is finding its way more commonly into health reports nowadays. Following this comes the report proper, of which the first section is non-statistical and deals in a general and readable way with the various activities of the board. From this we learn that, in 1913, the death-rate for the city was a little over 12 per thousand and the birth-rate 18.5. The total amount appropriated for the board during the year was \$3,700, less than eleven cents per capita population. No statement of expenditures is given except that the appropriation was sufficiently large and that the salary of the plumbing inspector is \$1,000 per year. Other members of the staff include a health officer, a chemist and bacteriologist, three

public vaccinators; a fumigator, and a veterinarian who also serves as dairy inspector.

The dairy inspection includes a classification of all dairies into first class, second class and worse than second class, and publication of results. The water shed receives frequent inspection and the city water supply has been kept in good condition although treatment was necessary to keep it free from algæ. Garbage and refuse collection is carried on by private individuals but the disposal is by burial with ashes and lime at a city dump and is said to be more satisfactory than cremation.

The contagious disease situation shows some improvement, a fairly marked reduction in all cases except typhoid, scarlet fever, and diphtheria, the latter being high on account of an epidemic of mild cases which were not promptly reported. The infant mortality rate is 163 per thousand births. The classification of deaths according to cause follows the common Pennsylvania system which apparently consists of placing the death under whatever name the doctor chooses to use, without regard to system.

DEPARTMENT NOTES.

Social Centers as Health Centers.

The following valuable suggestion is clipped from the *Monthly Bulletin* (April) of the *Duluth Health Department*. Where the social center idea is being developed it certainly offers an excellent field for public health education:

"The social center idea which is spreading over this country so rapidly is no passing fad. It is a movement worthy of the attention and support of every thoughtful citizen. In all cities where it has been tried, the eager, enthusiastic public's response placed the movement on a substantial foundation. In this respect Duluth has been no exception.

"Briefly the prime object is to utilize each school plant or some central place for the utmost good—socially, intellectually, morally

and physically—of every individual in its neighborhood.

Naturally this activity is of immense importance from the public health standpoint.

The writer is at a loss to understand why the *Public Health* aspect of this movement has not been properly emphasized or effectively utilized.

We have not time nor words to emphasize the matter as it much deserves. The effect of home environment upon individual health, and of civic environment upon community health, are now quite well understood in all their phases. Preventive rather than curative agencies are being energetically applied to all forms of social distress which are, indeed, all closely interwoven.

"The preventive phase is what makes

the social center movement timely. In the past few years we have witnessed the launching of numerous campaigns for the cure and relief of delinquency and distress. In fact there has been a tendency to become over sympathetic about many forms of delinquency. If this energy was directed along preventive channels it would do real effective work."

Efficiency in the Water Works.

In the May issue of *The American City*, E. L. Loomis, superintendent of the Valparaiso (Indiana) Water Company discusses efficiency in the water department. After discussing briefly some of the technical subjects connected with mechanical efficiency, fuel values and so on, he makes the following valuable suggestions in regard to other branches of the work:

"In connection with the operation with filtration systems, a good serviceable laboratory would seem to be indispensable for the necessary tests. Cities without such systems and having water at times of questionable quality will find apparatus for the use of hypochlorite of lime to be inexpensive and of great value.

"By the use of steam and water pressure recorder gages, if supplemented with accurate hourly notations of coal consumed and water pumped, the engineer and manager are afforded definite knowledge concerning the workings of the plant, and also furnished a permanent record of the same.

"So well known is the value of the meter that it would seem to be superfluous to make mention of it here. And yet the fact remains that there are many plants still operating almost, if not entirely, upon flat-rate bases. As a conservator of water this device is second to none, and its value is closely followed by the meter-testing machine. For leakage inspections in the distributing system the detectorphone and pitometer are both widely recommended.

"For the office there are many devices worthy of adoption and use, such as the adding machine, the typewriter, addressograph card indexes, filing apparatus, loose-leaf systems, etc. An accurate map show-

ing definitely the location of all mains, valves, and service boxes is of inestimable value and should be deemed an indispensable part of every system. A few well-selected technical books and the best water-works journals will prove to be not only sources of information and pleasure, but of actual profit as well. For articles of especial interest, should one wish to dispense with indexes, a scrap book might be used to good purpose."

Electrically Sterilized Milk.

New methods of sterilizing milk are continually being suggested—by ozone, by ultra-violet light, etc., but most of them fail when put to a practical test. It is unfortunate that the following clipping from *The American City* (May) does not tell more of the technique of a method which appears to be an exception to the common rule.

"The Liverpool Corporation is supplying, through its milk depots, milk which has been sterilized by electricity to about 1,000 babies daily.

"The new process was devised by Alderman Anthony Sheldermine, who is chairman of the local Infant Life Preservation Sub-Committee. One advantage claimed for the process over sterilization by steam is that the milk tastes the same as when it leaves the cow. Strict tests show that all contamination, tubercular or otherwise, is entirely removed.

"For the past ten years many thousand babies have been fed through the Liverpool milk depots. The babies thus fed are visited by women inspectors, who report the results to headquarters."

Duties of a Health Officer.

The *Health Bulletin* of Portland, Ore., contains in its April issue a brief statement of the duties of the health officer of today. The list is not complete; a few important points such as, for instance, popular educational publicity, are omitted.

"It has not been very long since the only work of the health officer was to 'break up' epidemics of contagious or communicable diseases, viz.: smallpox, diphtheria, scarlet fever, yellow fever, etc.

"But at the present time his duties have increased to a great extent. Instead of stopping these epidemics when once started, his chief endeavor is to prevent them from starting. In other words, it is better to prevent than to cure, though it requires much more work.

"The demand upon the present-day health officer is that he must devote his entire time to this work and in addition he needs a number of expert assistants.

"Some of the demands made today upon health officers are enumerated as follows:

"1. That he shall keep the public free from communicable diseases.

"2. That the food supply shall be wholesome.

"3. That the air breathed shall be kept free of contamination.

"4. That the drinking water shall not be polluted.

"5. That the back yards shall be kept clean and sanitary.

"6. That school children shall receive medical examination.

"7. That adult workers in factories, bakeries, and restaurants should receive medical examinations.

"8. That milk must be clean and that the cows supplying the same be free from disease.

"All of which demands a wide range of activity and eternal vigilance."

Suggestions for Improving the Food Supply.

The Healthologist, the bulletin of the Milwaukee Board of Health, contains in its March issue the following recommendations for improving the food supply of Milwaukee, as prepared by the Chief of the Food Inspection Division:

"1. All meats sold in Milwaukee should be inspected and stamped by the Health Department. It should be made an offense to sell meats that do not bear the department stamp. The only exception should be made in the case of meats prepared under the supervision of the United States government.

"2. A municipal slaughter house should be established, this slaughter house being

designed to concentrate all slaughtering in one place where inspection can be readily undertaken and where the stamping of meats will be insured.

"3. More stringent regulation relative to the manufacture of sausage, and additional inspectors, if necessary, to enforce such regulations.

"4. The appointment of at least one inspector to devote his entire time to the supervision of fruit shipments at the railroad fruit houses. The public little understands how vast an industry the fruit produce market represents and, since fruit frequently is decayed or frost bitten or otherwise damaged and rendered more or less unwholesome, it is essential that careful inspection be carried out.

"5. The appointment of at least one and preferably several additional inspectors to devote their entire time to restaurant, saloon lunch and hotel inspection. The state of Wisconsin is now licensing hotels and restaurants. The kind of enforcement of this license law attempted by the state, however, is ridiculous and outrageous. The state is issuing licenses indiscriminately to restaurants, hotels and lunch rooms, regardless of their sanitary conditions or fitness to conduct business. This is one case in which the state departments should be prevented from interfering with home rule and be stripped of their authority in cities of the first class.

"6. An ordinance prohibiting the peddling of meats or fish on the streets, and a strengthening of the existing ordinances relative to the handling of foodstuffs from wagons or when not properly protected from dust and filth."

Civil Service in Ohio.

"The recent act placing state and municipal employees under civil service received varying interpretations from city attorneys, some holding that city health officers were not in the classified list, others claiming that all employees of boards of health came under the provisions of this act. Attorney-General Hogan has recently ruled that all city health officers are in the classified list, and, if in office on January 1, 1914, as a result of appointment, and after taking no examination,

must submit to a non-competitive qualifying examination in 1914. This ruling does not apply to village and township health officers, who will be appointed as heretofore.

Cleveland Medical Journal, May.

Regulating the Milk Supply.

The Bureau of Health of Altoona, Pa., has recently published a five-page booklet, entitled "Rules and Regulations of the Bureau of Health of Altoona, Pa., Governing the Production and Sale of Milk or Use in the City," containing the rules adopted on April 1, 1914. The regulations are well planned, comprehensive, and up to date and worthy of consideration by other boards which are planning milk regulations. Among the up-to-date ideas is the requirement that all persons handling milk which is to be delivered to the consumer without further pasteurization must have received the preventive inoculation for typhoid within three years.

The Minnesota Public Health Association.

"At a large and enthusiastic gathering at the Minnesota Club in St. Paul on February 25, there was organized the Minnesota Public Health Association which, we believe, is destined to be of wide and far-reaching importance for the well being of the people of Minnesota. This association is an outgrowth of the Minnesota Association for the Relief and Prevention of Tuberculosis which has done so much good work in the past but which seemed to be too narrow in its scope to accomplish its full purpose and it was, therefore, thought desirable to merge it into an organization which would deal with all public health problems, and by attracting wider interest would accomplish greater results. A significant feature of this first meeting of the new association was the fact that while it was originated by physicians, the attendance and the principal speakers were largely non-medical men and women. Brief but forceful and stimulating addresses were made by the governor of Minnesota, the president of the University, the secretary of the State Board of Health and several others. The keynote of the remarks of most of the speakers was that there must be a campaign

of education and publicity, and that there must be a general recognition of the fact that the problems of public health are problems of the people and not of the medical profession. This, in our opinion, is the whole secret of success in the advancement of preventive medicine. Public health legislation will be obtained when the people demand it and not before. The people, then, must be made to understand what preventive medicine has to offer; they must be taught that public health is a purchasable commodity and that it is cheap at any price. When this is thoroughly understood and when the economical importance of public sanitation is made manifest, the people will demand of their legislators that those who have the knowledge of how to prevent preventable diseases be given the power to do so."

The St. Paul Medical Journal, April.

Bulletin of Ohio State Board of Health.

Among the best exchanges which the JOURNAL receives is the *Monthly Bulletin of the Ohio State Board of Health*. It is edited by Dr. E. F. McCampbell, secretary and executive officer of the board; with Dr. A. G. Patterson, director of the Division of Public Health Education, and Dr. F. G. Boudreau, director of the Division of Communicable Diseases, as associate editors. The various members of the official staff of the board act as contributing editors.

The March number contains 180 pages and the articles are so unusually valuable that we shall briefly mention a few of the more important. The first is by Dr. R. H. Bishop, Jr., of Cleveland, Ohio, and is entitled "Sociological Aspects of Recent Reorganizations of Health Departments." (Published in the May issue of this JOURNAL.)

The second article is "The Doctor's Dream," by Dr. Vaughan of the Michigan State Board of Health, already widely reprinted elsewhere. An article on acute poliomyelitis is concluded in this issue and contains eight full-page plates. Another article, "Diphtheria," begun in a previous issue is concluded here and in addition to containing extensive notes on personal observations is accompanied by an extensive

bibliography and nine full-page plates illustrating Westbrook's types and various morphological mutations from the author's own experience. Other articles take up "Sewage Disposal," "The Relation of Plumbing Inspection to Preventive Medicine," and various subjects of more local interest. There are a number of short and pointed notes of less technical nature and several short and easily readable reprints.

While opinions appear to differ widely as to the proper sphere of a board of health bulletin, the Ohio publication will be found to combine an unusually large number of the best ideas we have.

Supply Equals Demand.

The following article, clipped from the bulletin of the Health Department of Asheville, N. C., is only one of many which are now being written in an effort to educate the public to the point where they will demand more adequate appropriation for public health work. It is well known that supply is always equal to demand and this is true no less of health department appropriations than of other things. It is unquestionably true that many health departments would reap a larger return by investing their money in popular education and publicity than in any other way and the results would be far more permanent, both in increased appropriations and in popular coöperation. The clipping is only one of many which are being used with good effect by some of the most progressive health departments.

During the past year the federal government reports show that \$4,600,000 was spent upon forestry service. This is all good and well, but at the same time they spent but \$2,500,000 for the protection of the health of one hundred million people, or to check the annual loss of 600,000 lives from preventable diseases.

"Does the government really place a higher estimate upon trees than upon men? Not at all. Do you place a higher valuation upon a tree than upon a man? Do you place a higher valuation upon a twig than upon a child? No, you do not at all. At the same time, the people of this United States have

let our representatives in Congress understand that they are extremely interested in the protection of our forests and rightly so, while we sit quiet and idle, not even thinking, while 600,000 people in this United States die every year from preventable diseases. Some of these 600,000 people are your people and my people—some of them may come from your family and my family. Hadn't you better let your congressman and legislator know that you are interested in the life and health of your people—of your children? If so, your representative in our state and national government will pay more attention to the health of your people and your children than they do to the trees on the mountain-side. It is up to you."

Health Survey in Cincinnati Schools.

The following notice to physicians and the general public is quoted from the *Weekly Report of the Cincinnati Board of Health*, for the week ending May 2:

"An important survey of the school children of the Cincinnati schools has been undertaken by the Department of Health through its force of district physicians. The object is to determine the number of those suffering with conditions which not only lower school efficiency but which may act as permanent handicaps in adult life.

"Many of these conditions are curable, and the ultimate object of the survey is to secure appropriate treatment at a time when cure can be expected to be brought about.

"Many conditions that cannot be permanently cured can be arrested, or the training of the individual directed along lines that reduce the evil effects of the handicap to a minimum, thereby reducing the number of permanent dependents.

"Special attention will be given to:

"1. The number of cases of chorea attending regular classes.

"2. The number of cases of epilepsy attending regular classes.

"3. The prevalence of scoliosis.

"4. The prevalence of tuberculosis of bones and joints.

"5. Deformities due to disease or accident—loss of members, as eye, hand, arm, leg,

foot; paralysis or atrophy of muscle groups.

"Cases will be referred to family physician for the appropriate treatment wherever possible.

"Those who, through misfortune, are unable to secure the services of a private physician will be referred to clinics or hospitals. In this way many prospective liabilities will be transformed into permanent assets.

"The hearty coöperation of the general profession is earnestly requested."

Encouraging Vaccination.

The policy of some boards of health in refusing to quarantine small pox, on the ground that anyone foolish enough to remain unvaccinated deserves to have the disease, has been applauded by many, but the fact remains that the increase in smallpox will probably be more noticeable than the increase in vaccinations. Compulsory vaccination is our best weapon against smallpox, since even those who are not opposed to being vaccinated will postpone it unless a definite requirement is made.

Where vaccination laws cannot be passed and where the "conscientious objection" clause is offered as an excuse for evasion beneficial results may be obtained from such propaganda as the following from the February issue of the *Health Bulletin of the Board of Health of North Carolina*:

"The unvaccinated are the dangerous people. They are the ones, and the only ones, that perpetuate this loathsome disease, that cause gullible public officials to erect 'pesthouses' at public expense. And, by the way, public expense usually means at the expense of the vaccinated, for the best and most intelligent people of today are vaccinated. Only the careless, the ignorant, and particularly the negroes, are unvaccinated. To which class do you belong?"

"The Gist of It"

The *Health Bulletin of the North Carolina State Board of Health* has a section entitled "The Gist of It," which gives a series of short notes and suggestions which are easily readable and more effective than longer

articles. We quote the following from the February issue:

"It costs less per year to raise a baby than to bury it.

"Better be a fresh air crank than a canned air corpse.

"Sudden changes in the weather should be met by sudden changes in clothing.

"It is folly to follow the fashions or the almanac as an index when to change from light to heavy clothing.

"Public health is purchasable. Within natural limitations, a community can determine its own death-rate.

"You cannot consistently pray, 'Thy kingdom come on earth,' with a fly-breeding place in your back yard.

"A little attention to the quality of the air you breathe for the next month or two is likely to save you a lot of trouble.

"The permanent foundation for the general prosperity of the state must, in its final analysis, rest on the general health of the people.

"The sleeping porch is not only a matter of comfort in the summer, but it is fast getting to be a necessity all the year round.

"This is the height of the smallpox season. If you go about unvaccinated, you do so at your own risk, and if you contract smallpox you have no one to blame but yourself. If you are vaccinated you can give smallpox the laugh. You need be no more afraid of smallpox than you are of a Mexican invasion. If you have been vaccinated within the last five years, you can nurse a smallpox patient without any more danger of contracting the disease than in nursing a case of toothache."

A Correspondence Course in Vital Statistics.

A recent and valuable development of the university extension system, so common in the Middle West, is a plan introduced by the University of Kansas in coöperation with Mr. W. J. V. Deacon, state registrar of vital statistics. By this arrangement the correspondence-study department now offers a course in vital statistics and demography for which the small fee, five dollars, is charged.

The course is particularly designed "for local registrars, health officers, physicians, sanitarians and engineers," according to the announcements.

Announcements have been sent out by the Division of Vital Statistics of the State Board of Health to county and municipal health officers and to local registrars of vital statistics, pointing out the value of the course and the desirability of their enrolling. It is hoped that the enrollment may be sufficiently large to bring about a considerable improvement in the Kansas statistics. The idea is excellent and deserves to be copied elsewhere.

Coöperation in New York Health Work.

"In accordance with the provisions of section 46, the department has recently formulated rules and regulations for the protection of food in lunch rooms, restaurants, etc. It is the intention of the department to wage a vigorous campaign against careless and indifferent shopkeepers and others handling food sold to the public.

"The police commissioner has promised the coöperation of his department in the enforcement of these regulations, and patrolmen are to be instructed accordingly. A committee is now engaged in preparing a form of 'Extracts from the Sanitary Code with Instructions to Police Officers.' This

form will be submitted to the police commissioner with a request that it be edited from the police standpoint and then printed and distributed to his force.

"All citizens can help in this work by promptly reporting instances which come under their observation where the department of health's regulations are being violated."

Weekly Bulletin of the Department of Health of New York City, April 18.

"Following a conference with Deputy Commissioner Emerson, the Motion Picture Exhibitors' Association of Greater New York has generously volunteered the services of over eight hundred moving picture theatres for the educational work of the department. The start will be made today when hundreds of theatres in the city will display slides calling attention to the 'Clean-up' campaign inaugurated by Commissioner Goldwater. This will shortly be followed by announcements concerning typhoid fever, flies, care of the baby, etc.

"The clean-up announcements have been prepared in the form of lantern slides in English, Italian and Yiddish texts. Some of the striking statements read: 'Dirt breeds flies; flies carry disease; disease means doctors' bills. Avoid disease and doctors' bills by cleaning up.'"

Idem., May 16.

PERSONAL NOTES.

The following were elected to membership in the American Public Health Association, May 25, 1914:

Frank H. Edsall, M. D.
Edward S. Godfrey, Jr.
Frederick Clifton Moor, M. D.
Helen B. Pendleton.
F. L. Sawyer.
Howard B. Warren.

Prof. C.-E. A. Winslow will leave the Col-

lege of the City of New York after this year, to become director of the Division of Publicity and Education in the recently reorganized New York State Department of Health. Professor Winslow's headquarters will be at the New York City office of the State Department of Health, 25 W. 45th Street. He will continue to act as curator of Public Health at the American Museum of Natural History and as associate in Sanitary Science at Teachers College, Columbia University.

PUBLIC HEALTH NOTES.

Municipal Ice Plants.

Municipal Engineering contains, in its May issue, an article describing an ice plant at Weatherford, Okla., the only municipally owned ice plant in this country. The idea is one which is receiving rather general attention and is being considered by various cities and towns over the country. The federal government operates several plants successfully and the possibilities are well shown by its plant in Manila, which is highly remunerative even after bringing down the prevailing price of ice 25 per cent. In Weatherford efficiency of the electric light plant is increased by utilizing its output during the day when the load is light for the operation of the ice plant. It is found that the receipts from the sale of light and water just about equal the operating expenses but the ice plant brings in a handsome profit.

This is a subject which should enlist the interest and support of sanitarians, not only because of the direct effect of a bad ice supply upon health but also because of the great importance of cheap or even free ice in the reduction of infant mortality in the summer months, a question which has been found to be extremely important in our large cities of late years.

Tropical Diseases Bulletin.

The issue of the *Tropical Diseases Bulletin* for April 30 is a sanitation number and contains material which is of even greater interest to sanitarians than that usually contained in that valuable publication. The first section is devoted to reports of sanitary conditions in the various British dependencies in Africa and other tropical regions, and contains some extremely interesting information which is little known to the world in general.

The second section is devoted to a summary of the methods of preventing disease as practised in the tropics and includes discussion of typhoid, malaria, cholera, and plague, as well as of the more strictly tropical

diseases. The material given is up to date and very carefully condensed so that it is all the more valuable though it covers recent developments rather than attempting the whole subject in each case. Other sections are devoted to the disposal of waste, sanitary legislation and sanitary works.

Simple Rules.

The following rules are laid down by Dr. Eugene H. Porter as the fundamentals in the elimination of preventable disease from a community. They are well worthy to be copied still further since they point to the coöperation of the layman with the health officer, which is undoubtedly the first essential to efficient health work.

"The notification of every case when it is first recognized; the registration in central office of facts as to each dangerous thing or person; the examination of the seat of danger to discover its extent, its cause and new seats of danger created by it; the isolation of the dangerous thing or person; constant attention to prevent extension to other persons or things; destruction or removal of disease germs or other causes of danger; analysis and record for future use of lessons learned by experience; education of the public to understand its relation to danger, checked or removed, responsibility for preventing recurrence of the same danger, and importance of promptly recognizing and checking similar danger elsewhere."

Cancer Death-Rate in American Cities.

"That there is need of the national movement to check the death-rate from cancer which has been inaugurated under the direction of the American Society for the Control of Cancer is indicated by the figures of mortality from this disease in 1913. The statistics of our seven largest cities, recently tabulated, show that in that year the cancer death-rate in each case was the highest on record. For New York City the rate was 82

per 100,000 of the population, against an average of 79 for the last five years; for Boston, 118, against an average of 110; for Pittsburgh, 79, against an average of 70; Baltimore, 105, against an average of 94; for Chicago, 86, against an average of 81; Philadelphia, 95, against an average of 88; for St. Louis, 95, against an average of 85. The combined cancer death-rate for the seven cities was 89 per 100,000 of population for 1913, against a combined average of 83 for the last five years.

"It is held by many that the recorded cancer death-rate does not mean an actual increase of the disease to the extent indicated. According to this view improvements in the diagnosis of hitherto obscure diseases has caused cancer to be much more frequently recognized and recorded. Yet these figures of 1913 as compared with the average for the last five years, when we have presumably been enjoying the results of this greatly improved medical technique must be considered most significant, and it is hard to believe that the increase is due solely to greater accuracy of diagnosis."

Weekly Bulletin of the Board of Health of New York College, May 2.

"Safety First" in Our Milk Supply.

"Danger means exposure to injury, pain or other evil.

"Its synonyms are risk, peril, jeopardy, and when known, is usually foretold by a red signal.

"Our milk supply may be pregnant with all of these and usually without the red signal. It is difficult to classify the dangers contingent upon the milk supply except to say they may be to the purchaser, in the nature of disease and deformity or, to the dealer, disaster of a pecuniary nature attendant upon prosecution for failure to comply with ordinances governing its sale.

"All producers of milk must recognize that 'safety first' cannot be dependent upon voluntary action merely. There is a public demand insisting that this great food necessity be furnished from healthy cows, procured in a cleanly manner, free from filth and disease producing germs, protected from

flies and other insects and containing all the food value normally present in milk. It is not enough to know that milk looks white and therefore must be of standard quality, for white has the power of concealing contamination; or that it tastes sweet and therefore is free from germs, for there are many disease germs that do not produce the physical characteristic of sourness. Neither does pasteurization correct all the evils that lurk unseen in this popular fluid. And so for these, and many other dangers we have no signals to show where they lie. As a consequence, all milk dealers must use every precaution to guard against careless production and distribution of milk for the time is here when summer diseases, typhoid and scarlet fever, throat affection of many kinds begin to appear. The milk producer should make sure that his cattle have pure food; that they are not compelled to drink from streams highly polluted with sewage or factory waste; that his utensils and containers are cleansed with pure water and sterilized; that his help be free from disease and have a knowledge of technique fit for the purpose of producing pure milk, for it is an industry no longer to be handled in a haphazard manner but by modern, scientific methods and skill.

"The dealer who is alive to these facts and puts them into practice will not want for talents but 'what he hath will increase one hundredfold.'

"The peddlers, or those who buy and sell milk on a sort of 'sight unseen' plan, would do well to test the milk they buy or demand a guarantee as to its standard of quality for the law recently upheld in police court makes the seller responsible for the quality.

"Let the milkman's slogan be 'safety first' in our milk supply!"

Toledo Sanitary Bulletin, April, 1914.

Social Hygiene.

The first issue of the *Monthly Bulletin of the American Social Hygiene Association* appeared in April of this year. It is issued by the association at 105 West 40th Street, New York, and costs three cents a copy, or twenty-five cents a year, or is included in the

price of any regular membership in the association. From the first issue we quote the following article on What Medicine and Religion are Doing for Social Hygiene:

"A committee of the New York Board of Aldermen recently passed an ordinance designed to eliminate dishonest advertising from newspapers, billboards, signs, and other advertising devices. The New York Academy of Medicine and the County Medical Society joined actively with the Health Department and the Society of Sanitary and Moral Prophylaxis in presenting the need for this ordinance as a factor in combating venereal disease charlatans and various agencies of vice. These organizations with the coöperation of others also urged the passage of a state law on the suppression of quack advertisements, but this effort was not successful.

"The officers of the 'Catholic Theater Movement' have issued a 'white list' of plays. This list will be steadily added to, and should prove an effective means of directing public attention toward those plays which are wholesome and desirable. It should be possible to develop in time, through this and similar efforts, some agency with a nationwide influence for good such as it is within the power of the National Board of Censorship of Motion Pictures to exercise.

"A strong force in the fight to carry to a successful vote the referendum on the Abatement and Injunction Law in California is the Woman's Christian Temperance Union. This organization has fought for this bill steadily for three years. If the fight succeeds it will be largely influential in encouraging other states to pass such a law. Mr. Franklin Hichborn is the corresponding secretary of the 'Campaign Committee for the Red Light Abatement Bill' (Northern California), office 755 Monadnock Building, San Francisco."

Society for the Control of Cancer.

The American Society for the Control of Cancer; 289 Fourth Avenue, New York City, has established a press service and has begun to issue circulars upon the subject of cancer. *Circular No. 2*, issued in April, describes the

organization, history, and plans of the society. *Circular No. 3*, also issued in April, is entitled What You Should Know about Cancer. The latter is intended for popular education and contains in short space (less than 1,000 words) and in very readable form a most excellent collection of facts regarding the nature and control of cancer.

Health bulletins may find it desirable to reprint the entire circular and may realize the value of such dissemination of information from the following facts clipped from it:

"Cancer is of greater frequency at ages over forty than tuberculosis, pneumonia, typhoid fever, or digestive diseases.

"At ages over forty one person in eleven dies of cancer.

"One woman in eight and one man in fourteen over forty years of age is attacked by the disease with fatal results.

"Largely because of public ignorance and neglect cancer now proves fatal in over 90 per cent. of the attacks."

The Cost of Pasteurizing Milk.

With a properly designed and properly operated plant, the average cost of pasteurizing milk is \$0.00313 a gallon, and of cream \$0.00634 a gallon, according to tests recently conducted by the United States Department of Agriculture. These tests also show that the "flash" process, by which milk is raised to a temperature of 165° F. and kept there for a moment only, is more expensive than the "holder" process, in which milk is maintained for thirty minutes at a temperature of 135° to 145°. The "holder" process requires 17 per cent. less heat than the other, and in addition there is a saving on the expense of cooling. For hygienic reasons, also, the department recommends the "holder" process.

Many milk plants and creameries, it was found, do not attempt to make any use of the latent heat in the exhaust steam from their engines and steam-driven auxiliaries. This heat would be sufficient, in many cases, for all the pasteurizing done in the plants, if it were properly utilized instead of being permitted to go to waste. When exhaust steam is used, it is calculated that for every

400 pounds of milk pasteurized per hour with it, one horsepower is taken from the boiler load, with a consequent saving in fuel cost.

Another common source of waste was found to be the faulty arrangement of apparatus and leaky piping. The loss from these causes may run as high as 30 per cent. of all the heat required, a loss that can be reduced to negligible proportions by proper arrangement. The use of the regenerator, in particular, by which a large portion of the heat in the pasteurized milk is transferred to the raw product, is also an important factor in securing maximum economy.

In considering the cost of pasteurizing, the investigators estimated the life of the necessary apparatus at four years, and the annual depreciation, in consequence, was figured at 25 per cent. This is due to the fact that the whole dairy apparatus must be taken apart after each operation in order to give it a thorough cleaning. This necessarily results in rough usage. The mechanical equipment, such as the engine, boiler, shafting, etc., has, on the other hand, been considered as depreciating at the rate of only 10 per cent. per annum.

In these tests the results of which are contained in *Bulletin 85*, the investigators have confined themselves entirely to the engineering features of pasteurizing, their object being to ascertain as closely as possible the necessary cost of the process. The hygienic and sanitary aspects of the question are covered in other publications of the Department of Agriculture.

Ward Infections in Infants' Hospitals.

In the May issue of the *American Journal of Diseases of Children*, Drs. W. F. Chappell and Alan Brown discuss respiratory infections in infants' wards as observed in the Babies' Hospital in New York. They begin with the following observations:—

"The subject of ward infections in children's hospitals has long been one of discussion from the standpoint of contagious diseases, while the infectious nature of the respiratory affections has received little attention until recently. In the wards of the Babies' Hospital it is not measles,

whooping-cough or scarlet fever that is feared, but rather the pneumococcus and streptococcus infections, both of which may be said to be omnipresent. In fact it seems evident that if we could prevent the respiratory infections, which begin as simple rhinitis or pharyngitis and frequently end in bronchopneumonia, we could save a much larger number of feeding cases (marasmus babies).

"During the past two years we had 129 instances of acute naso-pharyngeal infections in our feeding wards and not one single case of measles, whooping-cough or scarlet fever. During this same period we have lost from uncomplicated marasmus but twenty-nine out of 271 marasmus babies treated, while of the total deaths, ninety-seven in number, two-thirds were due to complications, chiefly respiratory.

"A striking change seen in the last fifteen years in the Babies' Hospital has been the reduction in the proportion of intestinal diseases from 36 per cent. of the total admissions to 13 per cent., and an increase of severe acute respiratory infections from 8 per cent. to 17 per cent. This is only further evidence that the intestinal diseases are being prevented in the city at large, while the respiratory infections are not. Nothing in the hospital service is more discouraging than the development of acute nasopharyngitis, otitis, laryngitis, bronchitis and bronchopneumonia in infants admitted for other conditions. In fact, these infections are more serious than the common contagious diseases and are always more difficult to control, because the source of infection and manner of spreading are less obvious."

The article continues with a record of cases and a discussion of modes of transmission and prophylaxis. The authors recommend the following methods of prophylaxis and give an interesting report of their results:

"1. Increasing the child's individual resistance by careful attention to its nutrition.

"2. By careful nursing for the purpose of minimizing the danger of transmitting infection.

"3. By the direct prevention of the respiratory infections by postnasal douching."

Worthless Pellagra "Cures."

Public Health Reports in its issue of May 1 discusses the value of the preparations commonly advertised in the Southern States as cures for pellagra. The results of the investigations by the Public Health Service are quoted below:

"The Public Health Service has examined several of these preparations. Those examined were received put up in packages containing usually a bottle of liquid and a box of tablets or capsules, sufficient in amount to last the patient for a short time (two to four weeks), and were marked to sell, some for \$5 and one for \$10 a package. The preparations upon examination were found to contain inexpensive inorganic salts, such as iron, magnesium, lime, and sulphur. One consisted mainly of copperas, charcoal, and small amounts of quinine.

"Nothing was found in these preparations which, so far as the scientific world has been able to learn through the laborious investigations of trained workers, has any value in the treatment of pellagra. Some of the ingredients might be of service at times to relieve some of the symptoms. On the other hand, some of the ingredients would undoubtedly aggravate other symptoms, so that these preparations on the whole are probably not only not beneficial but really do harm to the sick.

"Pellagra is a disease in which the patient has times when he is quite ill, followed in many cases by periods of weeks, maybe months, when he feels comparatively well. Then, too, some cases of pellagra get better regardless of the drugs or medicines they may take. Among those who have taken the nostrums above referred to are, naturally, patients who have improved, some who have gotten well, and some who have died, the same as among pellagrins who have not taken these preparations. Owing to the natural tendency to give credit for recovery to that medicine or drug which one happens to be taking, a number of pellagrins undoubtedly sincerely believe they have been helped by the taking of these nostrums with the result that the manufacturers have no difficulty in

obtaining testimonials as to their beneficial effects."

Sanitation and Cleanliness.

Doctor Stimson of the Public Health Service in the *Public Health Reports* of May 8 discusses the promiscuous use of the word "sanitary" by butcher and baker, if not by candlestickmaker, and the frequency with which the term is abused. He points out the fact that the popular desire for sanitation is readily satisfied by a strong odor of cresol, eucalyptol or what not regardless of whether the appliance has any further value or not. Doubtless the masking of bad odors is desirable to some extent but its chief effect is to gloss over bad conditions and produce a false sense of security. Actual cleanliness, on the other hand, not only produces better conditions but, by its psychological effect, is a stimulus to decency. Doctor Stimson says:

"A word about dirt and mechanical cleanliness. 'Dirt' means various things to the housewife, the sanitarian, the surgeon, the chemist, and the bacteriologist, depending on its composition and location. A surgeon might operate successfully in a room which a housewife considered untidy, but not with a knife which she would pass as clean. A bacteriologist might carry out successful research in a cellar which a dainty housewife would hesitate to enter, but not by using glassware cleaned by her methods. The sanitarian must appreciate the various standpoints from which 'dirt' is viewed, and must balance that cleanliness which is practical against what is theoretically desirable. But if his viewpoint is sufficiently inclusive, he will contend that grossly visible dirt, in the sense of the housewife, is always prejudicial to sanitary conditions. Even if the dirt does not of itself contain disease germs, its presence conduces to practices which are menaces to health. Promiscuous spitting on the floor is admittedly a dangerous practice. Will a person (capable of doing it at all) be more apt to spit on the floor of a neat apartment or on that of a dirty, ill-kept one? Will householders be more apt to dump rubbish and filth on the muddy banks of a black, foul-smelling stream, or on the grassy slopes of a

clear and wholesome river? There are incorrigibles, it is true, with whom the law must deal, but the general run of our citizens are susceptible to their surroundings, and respond to a neat, well-cared-for environment, by improving their habits and practices, and incidently their sanitary condition as a body."

Developments in the Friedmann Affair.

In response to numerous inquiries as to the effect of the Friedmann treatment of tuberculosis the New York City Board of Health has collected the following figures in regard to the present status of seventy-seven cases treated in hospitals of that city at the time of Doctor Friedmann's visit. The figures are clipped from the *Weekly Bulletin* of May 2.

"Of the total of seventy-seven patients, nineteen could not be found, while eleven were reported to have moved out of town permanently, so that nothing could be learned of their present condition. The department was, therefore, able to obtain reports on but forty-seven of the seventy-seven cases in question. The reports are summarized as follows:

At home.....	5
In hospitals and sanatoria (indicating failure to cure).....	22
Attending clinics (showing need of further treatment).....	7
Attended by private physician..	1
Died.....	12
Total.....	47

"Comment is unnecessary; the figures tell their own story."

Care of Tuberculosis Cases.

Bernard J. Newman, secretary of the Philadelphia Housing Commission, discusses The House as a Factor in the Evolution of Tuberculosis in February issue of *American Medicine*. The article is most instructive and calls attention to a phase of the subject too often neglected. We quote below measures which he recommends, together with some special suggestions not commonly considered.

"1. Requirements for sanitary surroundings to all homes.

"2. The elimination of dust-producing and like treacherous trades from all buildings used for human habitation.

"3. The prevention of room overcrowding and building congestion.

"4. Frequent and thorough disinfection of all rooms used continuously by tubercular patients, not only after the patient has been removed but periodically, while he is still making use of the rooms. This disinfection should include the removal of all paper from the walls and the substitution of paint or other washable surfacing.

"In addition to the foregoing, every case of tuberculosis should:

"1. Be registered soon after its inception and no person suffering from it in any form should be allowed to move to another house without first obtaining a permit from the health authorities.

"2. All such patients should be obliged to move from houses where sunlight and good ventilation are shut off, from all buildings where sanitation is below normal, from all old tenements and rooming houses.

"3. There should be an enforced vacation and condemnation of buildings unfit, by reason of age, or of insanitary conditions within the structure of the building, until they have been satisfactorily cleansed or reconstructed and made fit.

"Until these precautions are taken, the anti-tuberculosis campaign will fail to reap results commensurate with the amount of money contributed for its use."

Arguments Against Vaccination.

The March issue of *American Medicine* discusses editorially the best argument against vaccination, one which is gaining ground most rapidly and certainly has superficial reason upon its side. The fallacy lies in the fact that if vaccination is given up smallpox will immediately become a menace. Utopia may present a combination of law and endowment which will provide for the vaccination of every individual in the nation within a period of five years. Certainly this would be a great stride toward the fulfillment

of the dictum of Pasteur. We quote the editorial as follows:

"The growing opposition to vaccination is a matter of grave concern. This new movement, if it may be dignified as a movement at all, is not the illogical and absurd anti-vaccinationist crusade, but is the conviction on the part of very intelligent men that it is useless to protect against an infection which they may never encounter. They acknowledge that a proper Jennerian vaccination is a life-long preventive and they also state that if their children are to be subjected to danger of acquiring smallpox they surely would have them vaccinated. Their only argument is that there is some danger attending vaccination—an occasional pus infection or very rarely tetanus—and that the risk is more than the risk of getting smallpox! This attitude is not confined to laymen, but is taken by those leading men in the medical profession who postpone vaccination of their own kith and kin until the last moment. Two world-renowned men have confessed to us that they have had their children vaccinated only in obedience to public opinion in and out of the profession. The worst of the matter is that the profession as a whole uses exactly the same arguments in advising parents not to take any other prophylactic until the necessity arises—antitoxin of diphtheria for instance. Doubtless we could immunize everyone against plague and cholera, but what's the use if plague and cholera never come here? So we hear men saying that there is not one chance in a million of their children being infected with smallpox but that there is far more chance of a pus infection or tetanus from the vaccine. This would be sound reasoning if it were certain that the child would not suddenly be brought into contact with smallpox, for this is just what is happening everywhere, and the loss of life is thousands of times more than from vaccinia. In time we will make the operation absolutely safe, and this objection will disappear. In time also we will exterminate smallpox and vaccination will be unnecessary, but to bring about this desirable state, we must appeal to everyone

to do their share for the public good. At present the disease prevails practically all over this country, but it is never seen in Germany except as an importation."

Tuberculous Infection in Children.

In number 88 of the New Series of *Reports to the Local Government Board on Public Health and Medical Subjects* are presented accounts of two inquiries conducted by British investigators with regard to tuberculous infection in children. They are entitled, respectively, *The Incidence and Bacteriological Characteristics of Tuberculous Infection in Children*, by Arthur Eastwood, M. D., and Fred Griffith, M. B., and *An Inquiry, based on a Series of Autopsies, into the Occurrence and Distribution of Tuberculous Infection in Children, and Its Relation to the Bovine and the Human Types of Tubercle Bacilli*, respectively, by A. Stanley Griffith, M. D. The two are bound into a single pamphlet of 165 pages, with several plates illustrating cultural growths and diseased organs, and with an introduction by Dr. Arthur Newsholme.

Notes were taken and tables prepared on 195 deaths from all causes of children between two and ten years of age, at hospitals, none of which was especially devoted to tuberculosis. The first report deals with material from 150 cases, the second with material from forty-five cases. The statistics gathered are thus, of course, indicative of conditions extant rather among a hospital than among a normal juvenile population, but the seriousness of the mortal directly attributable to tuberculosis is, nevertheless, evinced. In the ninety-four cases of the first series in which infection was evident, sixty-one of the deaths had been due to the disease.

The incidence of tuberculous infection was 60.5 per cent. In 78 per cent. of these (47.2 per cent. of the total 195 examined), tuberculous lesions, verified as such by bacteriological tests, were found. In 5.1 per cent. (3.1 per cent. of the whole), bacilli were obtained in culture in the absence of lesions. In 16.9 per cent. (10.3 per cent.

of the whole), lesions were present, but the bacilli appeared dead.

The characters of the bacilli in lesions were especially studied. One strain was found which from its cultural luxuriance and pathogenicity toward rabbits could not well be classified, but was designated bovine from cultural characteristics. In another case bacilli of both types were obtained. Of the total number of cases in which tubercle bacilli were discovered, 81.7 per cent. were of the human type. In well over half those yielding bovine bacilli alone, death had been directly attributable to tuberculosis.

The data of the reports show that in about five sixths of the cases the infection was of human origin. Exact detailed methods for differential determination, as employed by the investigators, are given. The figures illustrate also the danger of cow's milk as a source of infection, corroborating the conclusions arrived at by the Royal Commission on Tuberculosis.

The investigations have been of some importance as showing the relative proportion of human and bovine infection, but only within limits. Different classes of subjects, in different surroundings, would probably bring to light other and varying proportions.

Insurance Agents to Coöperate.

In spite of the fact that their motives are not wholly altruistic it cannot be denied that some of the insurance companies are among our most enthusiastic and active agencies for improving the public health, and as such they deserve the thanks and appreciation of the public. Their most recent valuable service is noted in the following clipping from the *Weekly Bulletin of the Department of Health of New York City* (April 25):

"In view of the mutual interests existing between the health authorities and life insurance companies in the promotion of public health, it is not surprising to find that these companies are very willing to coöperate cordially with this department in carrying on an extensive educational campaign among the people of this city.

"The Department of Health has hereto-

fore frequently found it difficult to quickly reach large numbers of people. Press bulletins cannot be relied upon with certainty, as the newspapers frequently cannot find space to print them. Lectures, exhibitions, even moving pictures—all reach relatively small audiences. Circulars have been distributed through the schools, but this method has certain limitations.

"After a conference with Dr. Lee K. Frankel of the Metropolitan Life Insurance Company and Mr. Edward Gray of the Prudential Life Insurance Company, these companies have kindly placed the services of their agents at the disposal of the Department of Health for the distribution of public health literature. This means approximately three thousand agents visiting the homes of 750,000 families weekly. How important and valuable this coöperation will be can readily be imagined. The department seeks further coöperation along this line and will be pleased to hear from organizations which are prepared to contribute assistance."

The Toothbrush a Menace.

The March issue of the *Public Health Journal* reprints the address of Dr. W. P. Caver before the Academy of Medicine at Toronto. We quote a portion of his remarks:

"Before closing my remarks I would like to refer to a recent article on the bacteriology of the toothbrush (by Smale and Carmalt Jones). The effect of their investigation will, I think, be to make us all adopt a better technique in our care of the teeth, and the toothbrush.

"Their conclusions are as follows: 'A toothbrush becomes septic after once using, each hair becoming an inoculation needle, and the person using it may be vaccinated with such germs as flourish upon it. The toothbrush, therefore, as properly used, namely, for many months, may be the origin of pyorrhea alveolaris, which may lead to such grave consequences as we have just been discussing. The prevalent tooth powders and paste, as usually used, do not render the brush aseptic, and even one in

twenty carbolic acid is not effectual in so doing: How can this be met?

"1. All toothbrushes before and after use to be boiled five minutes.

"2. A new toothbrush can be used each day.

"3. Those wishing for a more prolonged use of toothbrush, can rinse the brush in trikesol 1 per cent., or allow it to stand between use in formalin 10 per cent."

Certainly these conclusions are interesting and perhaps will cause us to decide to abandon the toothbrush since (1) few toothbrushes can be boiled five minutes on a single occasion and retain their usefulness; (2) even one new toothbrush a day would amount to over \$75 a year by conservative estimate, and why should one have a new brush only once a day instead of every time one brushes his teeth (which should be at least twice a day); (3) if it is necessary to sterilize the toothbrush so carefully and continually to avoid this inoculation with the germs of pyorrhea alveolaris will not the majority of people avoid trouble and danger by using no brush whatever. Surely the conclusions of Smale and Carmalt Jones would be awe-inspiring if they were not ridiculous.

Kissing the Book.

The following interesting letter from a physician in British Columbia is printed in the March number of the *Canadian Public Health Journal*:

"Sir,—Old customs die hard. In many countries the method of being sworn in a court of law is by kissing the Bible. In England the Scotch method of holding up the hand is now accepted.

"To kiss a Bible which has been handled and kissed by hundreds, may be by thousands of others, is dirty, disgusting and filthy, moreover it may be dangerous. A large number of those who are asked to kiss the book never do so, but kiss their fingers instead. It seems to me that placing one's hand on the book or else holding it up in the hand would be quite as solemn and impressive as kissing it.

"A few days ago the following incident occurred to me. I had been summoned to

give evidence at the local police court, and while waiting to give my evidence quite a large number of 'ladies of easy virtue' were sworn in as witnesses, one of them I recognized as a patient I had recently treated for mucous patches in the mouth.

When I was summoned to the witness box I refused to kiss the Bible, and desired to be sworn with uplifted hands in Scotch fashion. I may say I had been sworn in this manner whenever I attended the county or supreme courts. In this case the magistrate informed me that he had no authority to swear me by any other method; the only exception he would make was for objection on religious grounds. As the objection was entirely on sanitary grounds, I had to leave the box without giving my evidence, much to counsel's annoyance, who insisted very strongly on my putting my scruples aside for once."

Knocking the Bubble Fountain.

From the April issue of *Life and Health* we clip the following portion of a contributed article. In publishing it the editor states that he does not thereby desire to unreservedly endorse it but leaves it to his readers to consider. Certainly it is suggestive.

"The bubble fountain.' The name sounds good and clean and sanitary, does it not? Men tell us it is all these things; but is it? You remember how for years we quenched our thirst at the public drinking fountain, with never a thought but that it was all right to do so. True, there were times when we had a squeamish feeling about it, but we put that aside with our scruples concerning one common communion service.

"Suddenly, a campaign was on, our eyes were opened wide, and we would neither drink from the public fountain nor commune from the common cup. Very good; a wise and disease-destroying reform was then and there inaugurated. No longer does the mother place to her baby's lips the rusty cup from which some foul-mouthed brute has just quenched his thirst. But what have we instead? Why, the 'bubbler,' which looks clean and white, at least until the iron in the water does its work. Freely the liquid bub-

bles up and falls back, laving the sides of the basin and apparently washing away all filth. No longer do we carry the 'sanitary drinking cup'; little opportunity or occasion do we have to use it. Instead, we firmly grasp the hat in the left hand, stoop as gracefully as we may, put our lips to the bubbling stream, and snatch such refreshment as we can. Surely it reminds one of childhood's days at the old spring, and it may be something of this was in the mind of the man who designed our bubblers.

"Would I drink from the bubbler? Not on your life. Too many times I have seen foul lips touching its marble basin, too many times have fouler mustaches been laved in its cooling depths. True, the water is in constant motion; but it is cold water, and who believes that germs die in cold water, or are thoroughly washed away by it? The bubbler is not sanitary. It is as foul and dangerous as was ever the old drinking fountain, perhaps more so; for at the fountain one could use his own cup, whereas at the bubbler he must come in unpleasant proximity to the place where the tramp and the drunkard have left their impress."

Comfort Stations in New York City.

Under the general auspices of the New York Association for Improving the Condition of the Poor, a survey has been made of the comfort stations, both public and semi-public, of that city. The survey is reviewed in a pamphlet by Dr. D. B. Armstrong, superintendent of the Association's Bureau of Public Health and Hygiene. In the review are presented the objects and methods of study, graphs and photos to show conditions and possibilities, and a short summary of statements, introduced for comparison, from public health and municipal officials concerning the work in other cities of this country and England.

Appreciation of how far secondary disease transmission and public carrier infection may be facilitated by common comfort stations led the investigators to the strictly sanitary survey; but the opportunity was not lost, while on the ground, to investigate other matters. Notes were thus made on the dis-

tribution of stations, their relative equipment, the public's use of present facilities and of semi-public stations, etc. The work was supplemented by bacteriological studies, under the direction of Dr. William H. Park of the Health Department Laboratories.

Public stations, it is found, are especially needed on the lower East and West sides. Elsewhere, except that the present floor space might be more wisely used and greater accommodations for the public might be provided in the subway and elevated stations, the number and distribution are satisfactory. Public stations in general seem better managed and equipped than semi-public, except in instances where the former are handicapped by lack of appropriations. There are still many striking deficiencies in equipment, such as, for instance, in towels, in soap, and in sanitary napkins; and in construction, such as in poorly planned doors, flushes, etc. Counts indicate that the public appreciates and will employ washing facilities placed at its disposal. Graphs are given in the pamphlet showing that where only cold water was provided, only 28 per cent. of those visiting the station washed hands, whereas, with hot and cold water provided, the percentage was 82. Soap from a holder meant 42 per cent. of washings, common soap 16. Individual towels meant 90 per cent. washed, common towels 60 per cent., in comparison with 22 per cent. where no towels at all were provided.

The bacteriological work resulted in the finding, in about 40 per cent. of the studies made on the points of contact about comfort stations, organisms from the intestinal tracts of the persons using them.

From the facts gathered in the investigation, and from comparison of them with those revealed by correspondence with other cities, the committee believes that definite conclusions may be drawn and definite recommendations made regarding washing facilities, pay toilets, concessions, and the like. It is recommended that the subway stations at several points be thrown open for public use, and that this use be kept in mind in the planning of future structures; that comfort stations at the public baths become more widely

used and advertised; that some space now wasted by reason of poor comfort-station planning be used to establish small information bureaus, where knowledge concerning employment bureaus, hospitals, milk stations, tuberculosis clinics, day nurseries, etc., might be obtained for the asking. More adequate signs are needed on many comfort stations. Doors and locks should be less widely used, and, where retained, the swing door and foot lock should be provided. Provision should more commonly be made of towels, soap, sanitary napkins, etc., either free or at small cost, and of opportunity to use them. Concessions should be more extensively granted to bootblack stands and like semi-public spots where some need of comfort-stations exists, thus avoiding unnecessary duplication of plant.

Attendants at comfort stations should be led to realize the responsibility of their positions and the extent of their opportunity to further sanitary conditions and habits. No attempt at sanitation can succeed, in the opinion of the committee, in the absence of an accompanying educational campaign. "It is important for the city to improve its equipment and make it more attractive. It is more important, however, that the people of the city be made to appreciate the purpose of this municipal expenditure. The responsibility for bringing this about rests alike on private organizations and the municipality's representatives."

Getting Rid of the Quacks.

"Quack doctors are the most vulnerable of big game. How astonishingly tender their commercial susceptibilities are has been shown by the *Chicago Tribune*. One week of exposure through the *Tribune's* columns practically ruined every venereal disease quack in the city. Some shut up shop and

disappeared. Others sat idle in empty offices, forlorn spiders at the center of flyless webs. Never before was so powerful and profitable an industry brought to such instant wreckage. What destroyed this pirate trade was not alone the direct result of the exposures, definite and potent though that was. The lethal blow was the eviction of all this class of advertising from the daily press. Within four days of the *Tribune's* declaration of war every morning and afternoon paper in the city, whether printed in English or in some other language (and there are a great number of Chicago newspapers published in foreign tongues), which was carrying this class of copy had been shamed or alarmed into throwing it out. The evening paper of William R. Hearst, who a year ago bragged mightily of having foregone his alliance with quacks, was forced to exclude advertising which represents in the neighborhood of \$70,000 a year blood money to that apostle of journalistic purity. Finally, the militant *Tribune* gives notice of its intention to stir up prosecutions under the law; or, if the present law be inadequate, to agitate for the enactment of a stronger statute under which the malefactors may be brought to book. In view of this newspaper's established reputation for carrying out to the fullest conclusion whatever it undertakes, it is a fairly safe prophecy the game is up. Out in Seattle the *Sun*, a lusty infant of far western journalism, performed a like service for its city; and some years ago the *Cleveland Press* made a valiant but only partly successful effort in that vicinity. But the Chicago campaign has been by far the broadest and most significant. On its letter-head the *Tribune* terms itself 'The World's Greatest Newspaper.' To our mind its anti-quack victory goes far toward making the boast good."

Collier's Weekly.

CURRENT PUBLIC HEALTH LITERATURE.

AMERICAN.

Boston Medical and Surgical Journal.

CLXX, No. 17. April 23.

Medical Inspection of Immigrants of Port of Boston, A. J. Nute.

Engineering Record.

LXIX, No. 17. April 25.

Costs and Methods of Building Large Sewers. H. R. Abbot.

Preparing Turbidity Standards. Francis D. West.

LXIX, No. 18. May 2.

Deep Sewer Work at Minot, North Dakota. J. R. Graham.

Sanitary Statistics for Michigan; Survey of Treatment, Costs and Relations of Typhoid Death-Rate to Water Supply. W. C. Hood.

LXIX, No. 19. May 9.

Copper Sulphate Treatment at Philadelphia Waterworks. Francis D. West.

Colloids in Water and Sewage Purification. Milton F. Stein.

Water Purification Plant at Coffeyville.

Air Displacement Hypochlorite Dosing Apparatus. H. W. Taylor.

Rapid Sand Filtration Plant at Trenton. Improved Water—Sampling Bottle. Richard H. Eurich.

Housing and Sanitation.

LXIX, No. 20. May 16.

United States Army Camp Sanitation in Mexico. W. C. Gorgas.

Chlorinator Controlled by Traveling Weight.

LXIX, No. 21. May 23.

Fundamentals of Drainage.

Preliminary Report on Sanitary Policy of Chicago. American Waterworks Association. Convention—Abstracts of Some Papers.

Journal of the American Medical Association.

LXII, No. 18. May 2.

Antityphoid Vaccination in the Army During 1913. Frederick F. Russell.

Man, the Principal Etiologic Factor in the Perpetuation of Malaria, Endemicity of the Disease in Temperate Zone. Graham E. Henson.

LXII, No. 19. May 9.

An Investigation of the Causes of Failure in Cow-Pox Vaccination. John N. Force.

Typhoid in the Large Cities of the United States.

Housing and Sanitation.

LXII, No. 20. May 16.

Syphilis as a Public Health Question. H. J. Nichols.

Chaparro Amargosa in Treatment of Amoebic Dysentery. P. J. Nixon.

Municipal Engineering.

XLVI, No. 5. May.

A Municipal Ice Plant.

Disinfection of Sewage—Its Success in a Small City.

Grades and Leakage in Intercepting Sewers.

Garbage Disposal at Erie, Pa.

New York State Journal of Medicine.

XIV, No. 4. April.

Relation of General Practitioner to Public Health. A. MacFarlane.

XIV, No. 5. May.

Quarantine Requirements. Joseph J. O'Connell. M. D.

Port of New York Quarantine Protection.

Medical Record, New York.

LXXXV, No. 16. April 18.

Syphilis, in Relation to Life Insurance. H. H. Schroeder.

Present Status of Typhoid.

Immunization in Hospitals and Training Schools of New York. A. Meyer.

LXXXV, No. 17. April 25.

Has Tuberculosis Death-Rate Declined Recently? T. J. Mayo.

New York Medical Journal.

XCIX, No. 16. April 18.

Ventilation. J. B. Todd.

XCIX, No. 17. April 25.

The Prophylaxis of Measles. John Ruhräh, M. D. Popular Information Regarding Typhoid Fever.

XCIX, No. 19. May 9.

Some Observations on the Child of Today. Thos. S. Southworth, M. D.

To Protect the Public from Wood Alcohol.

Public Health Reports, Washington.

XXIX, No. 17. April 24.

Report of Sanitary Survey, St. Joseph, Mo.

Rocky Mountain Spotted Fever. T. B. McCintic.

XXIX, No. 18. May 1.

Exploitation of the Sick—Alleged Cures for Pellagra being Advertised and Sold.

Plague in Cuba.

Typhus Fever in New Mexico.

Typhus Fever—A Brief Note on Prevention.

Malarial Fevers in Alabama.

XXIX, No. 19. May 8.

Fleas and Plague—Knowledge of the Mechanism by which Fleas Probably Spread the Disease.

Sanitation Misapplied

Pure Drugs and the Public Health.

XXIX, No. 20. May 15.

Plague in Yokohama.

Bacteriological Standard of Milk.

Water Supplies in Minnesota.

XXIX, No. 21. May 22.

Malarial Fevers—Prevalence and Geographic Distribution in Mississippi, 1913.

Sanitary Conditions in Alaska—Diseases Found among the Indians of Southeastern Alaska.

Southern Medical Journal.

VII, No. 5. May.

Investigation of Malaria in the United States by the U. S. P. H. Service. R. H. Von Ezdorff.

Malaria as a Public Health Problem. H. H. Shoulders.

Treatment and Cure of Malaria. C. C. Bass.

Malaria during First Three Months of Life. B. H. Booth.

Discussion Symposium on Malaria.

Factors in Prevention of Malaria. W. H. Deadeckir.

Quinine—First Malarial Parasites. R. H. Carter.

FOREIGN

Berliner klinische Wochenschrift.*LI, 13. March 30.*Progress in Treatment of Syphilis. J. Citron.
Prophylaxis of Cholera in Servia. Aumann.**British Medical Journal, London.***I, No. 2779. April 4.*

Hygienic Aspect of Coal Mining Industry in United Kingdom. F. Phufflebotham.

I, No. 2780. April 11.

Tuberculin as a Specific Cure. H. Sahli.

Deutsche Medezinische Wochenschrift, Berlin.*XL, No. 14. April 2.*Necessity for Facilities for Research on the Laws of Heredity. Sommer.
Bacteriologic Findings with Friedmann's Remedy. Rabinowitsch.**Journal of the Royal Sanitary Institute, London***XXXV, No. 4. May.*House Flies. J. Spottiswoode Cameron.
The Prevention of Tuberculosis, from the Social Side. Miss Hilda Clark.
The Social Aspect of the Housing Problem. F. E. Fremantle.**Journal of State Medicine, London.***XXII, No. 4. April.*French Public Health Service in Equatorial Africa. Conan.
Residential Open-Air Schools.*XXII, No. 5. May.*

The Pathogenicity and Virulence of Bacteria. Thiele and Embleton.

Lancet, London.*I, No. 4727. April 4.*

Medico-Social Problems from an Insurance Point of View. T. Oliver.

Medical Officer, London.*XI, No. 16. April 18.*

Syphilitic Infection as a Cause of Mental Deficiency. C. Arbuckle Brom.

XI, No. 19. May 9.

Public Health Administration. W. C. Rucker.

Munchener Medezinische Wochenschrift.*LXI, No. 12. March 24.*

Pathology of Trichinosis. G. B. Gruber.

*LI, No. 13. March 3.*Prophylaxis and Treatment of Pellagra on Basis of Vitamen Theory. C. Funk.
Differential Cultivation of True and False Diphtheria Bacilli. Heurlin.**Press Medicale, Paris.***XXII, 24, March 25.*

Tropical Germ Carriers. L. Landouzy and R. Debre.

Public Health, London.*XXVII, No. 8. May.*Spot Maps and House Infection in Phthisis. J. E. Sandilands.
Studies in the Epidemiology of Phthisis. A. S. M. Macgregor.
Statistics of the Incidence of Notifiable Infectious Diseases in 1913.**Public Health Journal, Toronto.***V, No. 5. May.*Water Filtration. H. W. Cowan.
The Problem of Alcohol. F. B. Gurd.
Isolation Hospital Planning. T. H. Whitelaw.
War against Infantile Morality. J. A. Bandouin.
Tuberculosis, a Business Proposition. A. P. Reid.**Tropical Diseases Bulletin, London.***III, No. 7. April 30.*Applied Hygiene in the Tropics.
Disease Prevention—Malaria, Cholera, etc.
Sanitary Legislation.

AMERICAN JOURNAL OF PUBLIC HEALTH

CONSERVATION OF VISION.

FRANK ALLPORT, M. D.,

Chicago.

Read before the combined meeting of the Chicago Medical Society and the Chicago Ophthalmological Society, Chicago, Ill., May, 1914.

Societies for the Conservation of Vision have been formed in various portions of the United States. They exist under different conditions. The membership in some is medical and in others, lay and medical.

In Pennsylvania, Indiana, Missouri, etc., the organization exists as a Committee of the State Medical Society; in New York, Illinois, etc., independent associations have been formed; in Ohio the "Commission," as it is called, is a part of the state government. There is also a National Association, independent in its nature, and mixed in its membership. Some of these associations, such as New York, Massachusetts, Maryland, Ohio, etc., are doing energetic work, while others are inactive and almost useless.

At the 1913 meeting of the American Medical Association, the Council on Health and Public Instruction appointed a Committee on Conservation of Vision, consisting of E. M. Alger, New York City; W. E. Bruner, Cleveland, Ohio; H. D. Bruns, New Orleans, La.; J. J. Carroll, Baltimore, Md.; E. C. Ellett, Memphis, Tenn.; Harold Gifford, Omaha, Neb.; Vard Hulen, San Francisco, Cal; W. B. Lancaster, Boston, Mass.; F. Park Lewis, Buffalo, N. Y.; William C. Posey, Philadelphia, Pa.; W. H. Wilder, Chicago, Ill.; Casey A. Wood, Chicago, Ill.; Hiram Woods, Baltimore, Md.; and Frank Allport, Chicago, Ill.; of this committee I was appointed chairman. The object of the committee was to produce interest and action in conserving vision, and to endeavor to concentrate under the auspices of the American Medical Association activities calculated to preserve the sight of this, and coming generations.

We began our work by utilizing the machinery of the American Medical Association. The Council on Health and Public Instruction sends out

each week a sheet called the *Press Bulletin*. This is sent free to nearly six thousand newspapers, and the printed matter upon its face can be used by the papers as editorials, news matter, etc. The printed matter consists of short, plainly written articles on health topics. They are unsigned. The council employs clipping bureaus, and through them it is ascertained that these articles are very extensively used. They are shaping public thought along medical lines in this country. The Conservation of Vision Committee has an appropriate article in the *Bulletin* each week, and its articles on "The Eyes and the Movies," "Face Powder and the Eyes," "Cross-Eyes," "Illumination in Homes, Offices, Schools, etc.," "Golf Accidents to the Eyes," "What is a Cataract," etc., have been extensively copied all over the country. The committee feels that this is a most important part of its work—as it reaches so many people, and is under direct control.

The next work of the committee was to write, print and circulate twenty pamphlets on popular eye topics. These are called *The Conservation of Vision Pamphlets* and are numbered from one to twenty. They are handsomely gotten up, in uniform style. The authors' names are given. They are short and plainly written, so that non-medical people can easily understand them. They are well illustrated. They sell for five cents a copy, or one hundred copies for \$3.50. They are also freely given away on proper application to either me, as chairman of the committee, or to Dr. F. R. Green, Council on Health and Public Instruction, American Medical Association, 535 North Dearborn Street, Chicago, Ill. Sets of these pamphlets have been sent to public libraries, women's clubs, teachers' institutes, state legislatures, health boards, etc., all over the United States, and the sale and distribution has been extensive. Some of the pamphlets are already in their third edition. Arrangements are being made to distribute Doctor Carroll's Pamphlet on the "Eyes of Transportation Employees" to every railroad surgeon in the United States. I give here a list of the pamphlets:

- Pamphlet I. School Children's Eyes, by Dr. Frank Allport, Chicago.
- Pamphlet II. Industrial and Household Accidents to the Eye, by Dr. Harold Gifford, Omaha.
- Pamphlet III. Wearing Glasses, by Dr. W. B. Lancaster, Boston.
- Pamphlet IV. The Relation of Illumination to Visual Efficiency, by Dr. Ellice M. Alger, New York.
- Pamphlet V. Trachoma in Eastern Kentucky, by Dr. J. A. Stucky, Lexington, Ky.
- Pamphlet VI. Auto-Intoxication and the Eye, by Dr. H. D. Bruns, New Orleans.
- Pamphlet VII. Eye-Strain, by Dr. Hiram Woods, Baltimore.
- Pamphlet VIII. Lenses and Refraction, by Dr. Frank Allport, Chicago.
- Pamphlet IX. The Eye and Its Functions, by Dr. Frank Allport, Chicago.
- Pamphlet X. Care of the Eyes, by Dr. Frank Allport, Chicago.
- Pamphlet XI. Infant Blindness, or Ophthalmia Neonatorum, by Dr. F. Park Lewis, Buffalo, N. Y.

- Pamphlet XII. Ordinary Eye Diseases, by Dr. L. W. Dean, Iowa City, Iowa.
Pamphlet XIII. Usual and Unusual Eye Accidents, by Dr. E. C. Ellett, Memphis, Tenn.
Pamphlet XIV. The Eyes of Transportation Employees, by Dr. J. J. Carroll, Baltimore.
Pamphlet XV. Ocular Hygiene in Schools, by Dr. S. D. Risley, Philadelphia.
Pamphlet XVI. Whisky, Tobacco and Drugs and the Eyes, by Dr. Edward Jackson, Denver.
Pamphlet XVII. The Oculist and the Optician, by Dr. Melville Black, Denver.
Pamphlet XVIII. Preparation for Blindness, by Dr. F. Park Lewis, Buffalo.
Pamphlet XIX. What to Do for Blind Children, by Dr. F. Park Lewis, Buffalo.
Pamphlet XX. Blindness from Wood Alcohol, by Dr. Casey Wood, Chicago.

I would like to suggest that these are excellent pamphlets for doctors to keep in their offices and on their reading tables for distribution and education. I am constantly giving away these pamphlets to patients who, having seen them, desire them. Some people wish information on one subject and others desire knowledge along other lines. The pamphlet topics are sufficiently varied to fill the wants of most people. Besides this it often happens that an oculist desires to instruct a certain patient on a particular subject. Almost all eye subjects are mentioned in these pamphlets and are plainly and understandingly discussed, and it would be far easier to give such patients an appropriate pamphlet or two than to take the time to explain the subject personally.

It seemed desirable to the committee to create a national sentiment in favor of conservation of vision, and for this purpose it was determined that lectures on this subject should be delivered in each state. A lecture bureau manager was appointed in each state who was willing to superintend the work in his state. Where a state organization for the conservation of vision existed, one of its officers was selected to carry on the work; but where no such state organization existed a prominent, energetic and willing oculist was selected. The plan was about as follows:

The "state manager," as he is called, should enlist the assistance of all the oculists he could to assist him in his work, acting, wherever possible, in harmony with local and state medical societies, both ophthalmological and general. Prominent and energetic oculists should be found who were willing to lecture on the Conservation of Vision on invitation. Such lecturers should reside in different portions of the state, so that long and expensive journeys should not be necessary. The state manager should correspond with local medical societies, women's clubs, teachers' institutes, boards of health and education, etc., and secure invitations for a lecturer to go to different cities to talk on the Conservation of Vision. Lectures should, if possible, be arranged for one month in advance, to give time for preparation, and necessary ethical advertising. The lecturers expenses should, if possible, be paid for by the ones issuing the invitation. The lecture should last about one hour and should be given in plain and un-

scientific language. A discussion should follow. In order to make these lectures easy to deliver, the committee prepared a box of about thirty colored and uncolored stereopticon slides and sent them to each state manager, to be loaned to his associates in the work whenever a lecture was to be delivered. These slides were securely packed in a strong box and locked with a Yale key. The box could be shipped from place to place by express, the key going to its destination by mail. In addition to this a pamphlet was prepared entitled "A Plan of Campaign for the Conservation of Vision." This pamphlet contained a full description of the plan, and what it was proposed to accomplish. A kind of skeleton lecture was included in this pamphlet suggesting subjects, etc., to be referred to in the lecture. These pamphlets were freely dispensed to all state managers, who distributed them to their associates in the work. Besides this, each lecturer was placed on the mailing list for the *Press Bulletin*, to which reference has already been made, so that he could see the new articles as they came out each week, and perhaps use them in his lectures. Each lecturer also received a complete set of the *Conservation of Vision Pamphlets*, as it was thought that these would greatly assist him in preparing his lectures. Quantities of the "Vision Charts for Schools," were sent into each state so that the lecturers could have all they desired of them. While these lectures were intended to cover all avenues of vision conservation, it was especially hoped that it would result in the use of the Credé treatment of the eyes of all new-born babes; in the lessening of shop accidents; and in the annual and systematic examination of all school children's eyes by school teachers; for it is reasonably certain that if these three procedures could be universally adopted, 80 per cent. of all blindness could be eliminated from this country. The Credé treatment for new-born infants, the providing and using of goggles and other shop safety devices for eyes, and the annual, systematic examination of school children's eyes, ears, noses and throats by school teachers in the United States could be accomplished at an annual cost which would not exceed \$250,000 per annum. It costs \$15,000,000 a year to care for the dependent blind in this country alone, to say nothing of those children more or less incapacitated by defective or diseased ears, noses and throats. Inasmuch as the examination of ears, noses and throats is provided for in the questions annexed to the vision chart, for the teachers' use, and as abnormal conditions of these organs can be investigated easily and speedily, at the same time the eyes are examined, and as the benefits to be achieved by this addition are enormous, it is earnestly recommended that teachers will include the ears, noses and throats in their investigations.

Emphasis should be laid on several points connected with these annual, systematic examinations of school children's eyes, etc., by school teachers.

First. The examinations are simple and require no medical education.

Second. Teachers are not expected to make diagnoses. They merely ascertain the fact through the questions, that something is wrong, and leave the rest to the doctor selected by the family for consultation.

Third. A child can be easily examined in five minutes and each teacher should examine the children attending her own room. By subdividing the work in this way, all the children in any city of any size can be easily examined in one day. A definite day in the early fall of each year should be set aside for these tests in all cities.

Fourth. These tests not only benefit the children by leading to the correction of their eye, ear, nose and throat defects, but the correction of these defects *benefits the teachers*, because such corrections usually add materially to the intellectual and moral character of the children, thus rendering them much easier to teach, and more pliable to discipline. Teachers should, therefore, be glad to do this work, without grumbling, both from selfish and unselfish reasons.

Fifth. There is no objection to these examinations being made by doctors or school nurses. This, however, would cost large sums of money and boards of education and health are never allowed enough money for even ordinary purposes. This is a fact which might as well be frankly recognized and acted upon. Let teachers, therefore, devote one day in the year to this work and get it done. They are easily capable of doing it. It takes no extra time for them. It is a benefit to themselves as well as to the children. It costs practically nothing. Therefore, let it be done.

The question may be pertinently asked, what has been the result of the state lectures? This has varied greatly in different states. No man was compelled to accept the position of state lecture bureau manager; the acceptance was voluntary and was decided after the work and ideals were thoroughly explained. After a promise of conscientious work was given, the box of slides and printed matter were sent, which represented an outlay of about twenty-five dollars in money, for each state. In some states this (at least, so far as results are concerned) has ended the matter. So far as I know, no work whatever has been done in some states; no lectures have been delivered; and nothing has been accomplished. My letters have been unanswered; my appeals have been unheeded. Perhaps a letter has been finally, at the end of the season, received, informing me that I do not understand conditions in that particular state, or that sickness, or business, or moving, or bad weather, or some equally important reason has prevented taking up the lecture proposition. Of course, after a gentleman accepts a position of this kind, and agrees to do the work, I felt I had a right to depend upon his coöperation, and, having once appointed him, the state was left in his charge and I felt I had no right to interfere. It has been, therefore, most discouraging for me at the end of the season, when

it was about time for me to make my report to the Council on Health and Public Instruction, and when it was too late to change state managers, to realize that no *real* work had been accomplished in quite a number of states. In some states the work for one reason or another has been delayed, but still work has been done, as many lecture engagements have been made for next fall with medical societies, teachers' institutes, Chautauqua meetings, women's clubs, educational conventions, etc. But I rejoice to say that in most of the states honest, conscientious work has been accomplished, and excellent results have been achieved. The results are, of course, not all that could be desired, but still, considering that this is the first year of the committee's existence, I should be ungrateful, indeed, if I did not feel gratified and much obligated to those gentlemen who have given this project their time, their labor, and their means. I beg to present, toward the end of this article, a tabulated report of this work up to the time of giving this narrative into the hands of the printer.

The question as to the future of this work now remains to be discussed. I would recommend:

First. The continuance of a weekly article on the eye for the *Press Bulletin of the Council on Health and Public Instruction*.

Second. A few more *Conservation of Vision Pamphlets* on interesting subjects and the increased circulation of these pamphlets.

Third. The continuation of the conservation of vision lectures in the various states. Many more of these lectures should be delivered, and the state managers should be changed, where the present managers have not shown a reasonable interest in the work. From twenty to twenty-five new slides for the stereopticon should be made, that will more fully illustrate the subject.

Fourth. I was at first in favor of encouraging the formation of State Societies for the conservation of vision, these societies to possess complete self government, but all of them to declare themselves in affiliation with the Committee on Conservation of Vision, of the Council on Health and Public Instruction of the American Medical Association, by a slender thread of connection. I was also in favor of asking those states, already possessing state organizations, to join with us in the same sort of affiliation. I was also in favor of proposing an annual meeting of this affiliated organization and the formation of a national body of this nature for the conservation of vision. Time and experience have, however, considerably modified my views and I now believe that other plans are better.

In the first place, there is already a national society of this nature. It is, it is true, highly inactive but still it exists and should, I believe, be encouraged to an awakening activity.

In the second place, local conditions, in many of the states, are not conducive to friendly assistance. However well meant such assistance

may be, it will, in some states, be regarded as meddlesome interference, and as an effort to rob existing organizations, whether active or lethargic, of some credit, which it is felt should remain with the local organization, and not be shared with even a well intending interloper. These views, I presume, are but natural to those people who have worked hard to develop a praiseworthy state society. They want the credit for their work and should have it, and I believe it is better that they should be let alone, and not asked to merge their identity or work with that of another organization. My recommendation, therefore, for the future is, that this committee shall do what it can to inspire the formation of state conservation of vision organizations, either as independent medical and lay societies, or as commissions of the state governments. It shall stand ready to advise and assist such work in any possible manner, but it shall not suggest a formal connection of any description, with the Committee of the American Medical Association. This committee should also be equally ready to advise or assist state organizations that already exist, and should coöperate with them in any way they may properly request.

Fifth. I would recommend that the work of this committee be extended, so that it shall become a potent power in the community. It should have a central office with a paid, interested, intelligent, energetic secretary, who could and would from time to time journey from state to state, upon request, and assist in the formation and perpetuation of state societies for the conservation of vision. His traveling expenses should be paid by those who summon him to the various localities. He should have a well equipped office, with one or two stenographers, and a library and files, containing *everything* that is printed on the conservation of vision. This office should be recognized as a central bureau of assistance, advice, literature, laws, etc., where all questions concerning this subject can and will be intelligently and willingly answered. Plans should here be devised for the formation of societies; for constitutions and by-laws; for the best ways of carrying on the work; for the building of model laws; and the best means of influencing legislatures and boards of health, education, etc. The work of such an office would be enormous and its influence widespread. Its work and purposes would enlarge and develop as time progressed, and I do not see how this noble enterprise can reach its legitimate and ultimate purpose unless something of this kind is made possible. But to do this, considerable money would be absolutely necessary, and I, therefore, recommend that this money shall be forthcoming from some source and that the good work shall be encouraged to go on.

Sixth. The distribution in all schools of crisply and plainly written leaflets concerning the care of eyes, ears, noses and throats. They should be taken home so that the parents can read them. They should be printed in various languages.

Perhaps even a better plan would be to have suggestions of this kind printed on the blank fly-leaf of all school books. The expense of printing would be almost nothing and the benefits to be derived would be incalculable.

I wish to thank Dr. H. B. Favill, Dr. F. R. Green and the Council on Health and Public Instruction for the moral and financial assistance they have rendered our committee. I also wish to thank all those who have written for the *Press Bulletin* and the *Conservation of Vision Pamphlets*. I also wish to thank all those who have assisted us in the work of the state lecture bureaus.

No.	State.	Manager.	Number of lectures.	Number of lecturers.	Number of cities.	Estimated size of audiences.
1	Ga.	Dunbar Roy	10	10	10	1,975
2	S. C.	C. W. Kollock	10	8	6	950
3	Ala.	S. Ledbetter	8	6	7	1,000
4	Ore.	J. L. McCool	3	1	1	300
5	N. C.	C. W. Banner	7	4	4	2,000
6	Kans.	R. S. Magee	7	5	6	1,050
7	N. H.	E. Fritz	8	7	8	1,725
8	Wyo.	G. L. Strader	1	1	1	100
9	Tenn.	E. C. Ellett	4	4	4	850
10	N. Y.	F. P. Lewis	2	2	2	225
11	Ark.	H. Moulton	5	4	5	400
12	Mo.	C. Loeb	15	12	8	2,300
13	Utah	D. M. Lindsay	25	12	24	4,675
14	Me.	J. A. Spalding	23	14	20	3,000
15	N. D.	J. H. Rindlaub	19	8	19	4,000
16	Conn.	G. H. Warner	2	1	2	850
17	Wash.	R. W. Perry	13	6	10	1,520
18	Md.	H. Woods	14	7	7	8,050
19	Ohio	W. E. Bruner	59	39	59	14,300
20	Ky.	J. A. Stucky	35	2	35	10,350
21	Del.	J. A. Ellegood	3	2	3	675
22	Idaho	R. L. Nourse	2	1	1	525
23	Va.	J. A. White	4	4	2	500
24	Minn.	F. C. Todd	3	3	3	500
25	Iowa	E. R. Lewis	3	3	3	500
26	Wis.	N. M. Black	1	1	1	250
27	Wash., D. C.	O. Wilkinson	2	1	2	200
28	Mich.	W. R. Parker	4	1	3	1,430
29	Ind.	A. E. Bulson, Jr.	45	20	25	5,000
30	Neb.	J. M. Patton	2	1	2	225
			339	190	283	69,425

I append a tabulated report of the State Lecture Bureau Campaign and desire to say that a large part of the work done in Ohio has been done under the auspices of the Ohio Commission for the Blind.

It will thus be seen that thirty states have reported work; 339 lectures have been delivered; by 190 lecturers; in 283 cities; to audiences aggregating, 69,425.

When to this is added the hundreds of thousands of people who have been reached through the newspapers, by the distribution of the *Press Bulletin*, and the thousands of people who have been reached by the *Conservation of Vision Pamphlets*, it will be seen that the work of this committee has not been in vain. I desire to also add that probably through the agency of the lectures, in the various states, school inspection of eyes, ears, noses and throats have been established in, at least, 200 cities.

7 West Madison Street.

THE COLLECTION OF MUNICIPAL WASTE.

W. F. MORSE,

Consulting Sanitary Engineer, New York City.

Read before the Sanitary Engineering Section of the American Public Health Association, Colorado Springs, September, 1913.

For more than twenty-five years the American Public Health Association has been considering the subject of the Municipal Waste of Towns and Cities. The papers submitted and the discussions at the meetings have dealt mainly with the disposal of the waste, the usual means of collection being accepted as the only known methods.

The progress of this country in sanitation has brought attention to the exceedingly unsatisfactory, often unsanitary and always expensive collection means in use, and we are now asked to go back to the beginning of this question and collect and formulate data for the communities which will improve the present somewhat crude system, and, if possible, suggest a more hygienic and less costly way of doing this work.

The methods in use in the larger cities are based upon the local conditions that obtain in each place, but the statistics and data that are gathered in New York, Philadelphia, Chicago and Boston do not give much help when the smaller cities and towns investigate the subject.

What is needed is the tabulation of figures obtained from a larger number of communities, from villages of 3,000 upwards, and cities of the third and fourth classes, the classification and comparison of which will give assistance and greatly help all places in their efforts to improve their conditions. A brief statement of the present means for the collection of the Municipal Waste in the largest number of communities will aid in the present discussion.

The collection of waste is made by four different agencies.

1. *The Individual System*, by which every householder takes care of his own waste in his own way, with the least possible trouble and cost, with no responsibility for after results, with the only purpose of getting it off his premises in the shortest time. A cartman is hired to take away the ashes in winter, the refuse and cast-off material in the annual spring cleaning, and from time to time at other periods the organic matter as the accumulation requires. So annually the privy vault is cleaned at any price that can be agreed upon, and unless there is complaint from neighbors or the local health officer the duty of this household is discharged. The results are, the retention of refuse upon the premises until it becomes objectionable or offensive, the payment of far more than would be the cost if done under regulation by the town authorities, and the promiscuous dumping of all

manner of house refuse by an irresponsible cartman at any place where he will not be detected. There are many large towns that have no way but this of getting rid of their waste.

2. *The Licensed Collector Method.* In this case a number of cartmen are licensed to make the collections upon payment of a small registration fee to the town. A route is established by each collector and a certain number of patrons secured which are fairly well looked after. The dumping ground may be upon the collector's property, or at a place which is designated by the town. Frequently the town secures the locations, keeps men employed to level the loads, control the flying papers, to burn off the inflammable parts at intervals, and has a general oversight of the work through the sanitary inspectors. The advantages are that the collectors, being known, can be more readily detected in any infringement of the sanitary regulations, but there is no remedy for complaints of the householder on the score of infrequent or bad collection service or overcharge for the work. The cost as a rule, is more than double to the householder who employs this service than would be paid by the operation of a municipal system, and being voluntary, there is no way of enforcing the regular collection periods, or of preventing the accumulations of considerable quantities of objectionable or dangerous matters.

When there are no sewers, under this license system, the removal of *night soil* is almost universally carried on, the collectors being required to provide an equipment of sealed barrels, to be kept clean, the work to be done at certain hours, with the use of prescribed disinfectants, and the excreta to be conveyed outside the town limits.

The trouble comes with the final disposal of this most dangerous matter. Being prohibited from disposal in streams or bodies of fresh water, its disposal on land is obligatory. It has no value as a fertilizer unless it is composted by thorough and intimate mixtures of peat, muck or loam, until it is oxidized and assimilated, requiring long periods of time to convert it into material that can be handled without nuisance. The cost of labor for this work, the areas of ground to be occupied and the exceedingly offensive character of the process, with the uncertain and possibly dangerous results when applied to certain kinds of vegetable growths, makes the whole method unsatisfactory and of doubtful financial returns. The prices charged for vault cleaning are frequently excessive and there is no relief for the householder. If the money paid for this work were used for a proper collection and disposal service under municipal regulation, it would not only defray this cost but go far toward paying for the garbage collection also. In an eastern city where this work is done by city teams and men at a very moderate price for each vault cleaned, the receipts paid a profit of 37 per cent. upon the cost, which defrayed 34 per cent. of the cost of the garbage collection in the same place.

An examination of the comparative costs of the license system was made by an inland town, and it was found that the householders were paying five to eight dollars per year for imperfect and unsatisfactory work. It was also found that if a municipal system were adopted and the cost assessed pro rata upon the property valuation, the expense would be approximately \$1.64 per household per annum or about 3 cents per week. Some of the disadvantages attending the license system of collection where the garbage is taken for hog feeding are stated in the report of the Commissioner of Public Works of an inland city of 100,000 population where this method has been used for many years.

"The principal objection to the present system of collection is due to the irregularity with which the collections are made in some parts of the city and the total absence of any system of collection in other parts. Cans of garbage are at times left to stand along the curb for several hours awaiting the irregular coming of the garbage collector. As a rule the garbage receptacles are not provided with covers and are frequently overturned by dogs and mischievous children and their contents scattered over the pavement to be left until the street is swept. The cans standing along the curbs are at all times very unsightly in appearance and during the warmer months become a decided nuisance from the obnoxious odors which are given off. When the garbage is not collected at all and has to be thrown with the ashes on the public dumps, the nuisance created is even worse. Here the garbage left near the surface quickly decays during warm weather to the discomfort and annoyance of all who happen to live to the leeward of the dumps. The garbage on the dumps also becomes the breeding place for myriads of flies which are, no doubt, more or less of a factor in the transmission of disease. Another nuisance from the garbage thrown on the dumps comes from the fires which are nearly always burning at some depth below the surface, the smoke of which is extremely pungent and disagreeable and often pervades the vicinity of the dumps for quite a distance.

A further nuisance of which the department receives many complaints, comes from the throwing of garbage and refuse on vacant lots and other out-of-the-way places. The detection of the offenders in such cases becomes very difficult, on account of the noxious materials usually being deposited under cover of darkness.

3. *The Contract System.* By this method the city advertises for bids for collection of the whole or a part of the waste. This is a most convenient way for the authorities and an improvement over the license system, but it has some disadvantages and as a whole is less satisfactory than a municipal method. The contractor is often compelled by competition to accept the work at a small margin of profit, giving poor service, and causing endless complaints.

His equipment and employees are not always of the highest class, the

contract being usually for a short period. There is limited responsibility, and his purpose is to do as little as possible at the smallest cost to himself. There must be maintained a vigilant oversight by the city authorities, and frequent inspections of the equipment, methods of work and of the final disposal of the waste, if this be deposited within the city limits. The householder benefits by a systematic collection at a somewhat lower cost, and if the work is done in a satisfactory manner, the city is relieved of a burden which it is often unwilling to accept. This is the method employed by the largest number of municipalities, and may be said to be the typical American system of collection.

4. *Collections and Disposal by Municipal Service.* In this case the city provides and maintains its own equipment and employees. This is at a somewhat greater cost than the contract method, but by efficient superintendence the results are far more satisfactory. The responsibility is upon the Chief of the Bureau and by him distributed through his associates, so that poor work can be noted and corrected without loss of time. The equipment and employees may also be used in other departments of the municipal service dividing the expense, and the whole force, with a good executive, if kept from political interference, can be brought to a high state of efficiency and take pride in their work.

The growth of municipal service in the collection of refuse is very marked in the past five years, due perhaps to the commission form of the city government where the work can be better kept free from political control, and more directly under the observation of the commissioner in charge.

The Comparative Cost of Garbage Collections. The data for tabulating the relative costs of collection service by one or the other methods referred to is difficult to obtain and not always reliable. From an inquiry made by the writer some years ago concerning the cost of garbage collections by the contract and by municipal service, it was ascertained that in fifteen cities of the first, second and third classes, the cost of collection was, 15 cents per capita per annum, and that in fifteen cities of the same classes, with approximately the same population, where the collections were made by municipal service, the cost was 22 cents per capita per annum. These figures should now be revised owing to the increased prices of labor and material, and the same cities now report the costs at 19 cents for contract service and 25 cents per capita for municipal system. These relative costs are an important factor in all inquiries of this sort, and it is to be hoped the standard forms for collection statistics which have been distributed by this committee will give us reliable figures on this point.

THE CLASSIFICATION OF REFUSE AS AFFECTING COLLECTIONS.

When considering the waste collections from a community the different classes of refuse are divided as may be required by the proposed disposal service.

- (a) Garbage—only, for reduction purposes.
Rubbish—separated for marketable portions.
Ashes—separated for ground filling.
- (b) Garbage—for reduction or for feeding swine.
Ashes and rubbish for land filling.
- (c) Garbage and rubbish for incineration.
Ashes for land filling.
- (d) Garbage—rubbish and ashes collected together.
For land filling or incineration.
- (e) Stable manure.
Bodies of the larger animals.

The advantage of these separate collections are apparent when the city has the means for separate treatment of each of the respective classes. New York, Brooklyn, Washington, Boston, each provide for three separations and recover values from each class of refuse, separately treated. In these cities the collection is made by the municipality, the disposal being done by contracting companies.

In St. Louis, Newark, Philadelphia, Cincinnati, Pittsburgh, the collections are made by contractors who also operate disposal works. The further separation of ashes and rubbish are made by the contractors after collection. The garbage separately collected in Providence, Worcester, Denver, Grand Rapids, St. Paul, Los Angeles and other cities and towns, especially in New England, is fed to swine.

In only two cities, Cleveland and Columbus, is the garbage municipally collected and disposed of by reduction. The ashes and rubbish are used for land filling. Where there are crematories or incinerators the garbage and rubbish are burned and the ashes dumped. Sometime the carcasses of the larger animals are also burned. When the Destructor methods are employed as at Richmond Borough, N. Y., Seattle, Milwaukee, Paterson, Atlanta, San Francisco, Berkeley, Montgomery, Halifax, Vancouver, the unseparated refuse is destroyed as collected from the household. Manure forms a part of the refuse in many places and is classified as garbage.

In the greater number of cities the collections are made of the garbage and rubbish by contract agency, and in the towns and villages by license method. There is comparatively little data which give reliable information of service for comparison. Each place deals with the question as it is connected with their local conditions and these vary so greatly with respect to the climatic environment, the character of the population, the kind of fuel used, the seasonal variations and other complex conditions, that it is

impossible to predicate situations that will apply to all. But there are some points common to all which may be taken as a basis for limited comparison.

The Average Quantities of Each Class of Waste. It is known that an American community of the usual mixed population will have a garbage output from 175 to 250 pounds per capita per annum, varying with local surroundings. The average quantities from fifteen large and medium-sized cities as reported in one inquiry was 199 pounds per capita per annum. Another more accurate report from four Ohio cities gave 190 pounds as the yearly average per capita. When making preliminary estimates about 195 pounds per capita per annum with due allowance for exceptional conditions will be approximate figures.

The proportions of rubbish vary greatly and are governed by the character of the community, the effect of private collections, and the prevailing fuel for houses, whether coal or natural gas. In the former case, where coal is used, the percentage by weight of rubbish is fairly constant, and averages from 5 per cent. to 15 per cent. of the whole collection.

When gas is used largely as fuel the proportions of rubbish are doubled. The city of Buffalo with gas as household fuel reports the collections of rubbish in volume to be equal to the volume of ashes, and this is true of most places where natural gas is plentiful.

The quantity of ashes yearly produced in any community are controlled by the character of the population, the use of solid or gaseous fuels and the cost of these. Under usual conditions when no gas is available about 73 per cent. to 75 per cent. of the total collection is house ashes. When gas is employed in households the ashes are greatly diminished in volume.

There can be no precise estimates of the relative proportions of waste in any place until all the local conditions are known, but for preliminary calculations the following proportions of refuse in a town of 8,000 population of the usual residential and manufacturing classes, where coal is used for fuel may be found of service.

Under usual conditions the amount of waste material from a northern town of 8,000 to 10,000 population is reckoned at 3 pounds per capita per day, which represents the average daily output the year round. But in actual practice it is usual to allow for an increased amount, because the quantities are always larger when means are provided for the disposal of the waste, and also to allow for the increase in population. The seasonal variation also influence the quantities. These are shown in the following table:

ESTIMATED REFUSE QUANTITIES AND PROPORTIONS IN TOWN OF 8,000 POPULATION.

Winter Quantities:

Household ashes,	75%	11.25 tons
Garbage,	15%	2.25 "
Rubbish,	10%	1.5 "
	<hr/>	<hr/>
	100%	15 "

Summer Quantities:

Household ashes,	45%	6 to 9 tons
Garbage,	35%	5 to 7 "
Rubbish,	20%	4 to 6 "
	<hr/>	<hr/>
	100%	15 to 23 "

The Means of Collection. The equipment of wagons and carts used in collection work is a subject which requires more time and space than is allowed for this paper.

Under the individual and license methods there is little attention paid to the wagons used or the means of final disposal. With a contract system in force in the hands of a competent contractor, and vigilant oversight by the health authorities the collection work can be done satisfactorily.

The regulations in force in one large city afford a good basis for working under the contract method:

"The contractor shall furnish watertight wagons or barrels, securely covered, all carts to be kept clean and lettered and numbered.

"The collectors shall call regularly at stated periods, remove and return the receptacles promptly, and in as clean a manner as possible, and shall not permit anything to be done in connection with the work that shall be needlessly offensive to persons or building.

"No deposits of garbage or other waste shall be made upon any lot or open space except by special permit, and all refuse matter shall be taken outside the city or deposited upon designated ground.

"Owners and tenants shall provide suitable receptacles for refuse that shall be securely covered and kept clean, and placed upon the curb or sidewalk or within areas or fence lines at the time of collection or one hour previous thereto.

"Penalties are provided for the infringement of the regulations upon properly investigated complaints made by the householder."

Collections by Motor Trucks. The use of motor trucks in refuse collection work will undoubtedly aid in lowering the cost and increasing the efficiency and sanitation of the service. At present they are employed in hauls from the central receiving stations in the larger cities, but not in the actual collection work, except in a few instances where considerable amounts of mixed refuse are gathered from closely built up or manufacturing sections.

Methods of Refuse Disposal. The present inquiry and purpose of this committee is intended to cover the collection of refuse, leaving the disposal work aside for future consideration. But there is one disposal method as applied to the combustible refuse or rubbish collection that is rapidly coming into use in the smaller cities and towns that promises relief from what is now a perplexing problem.

In many places when the garbage is taken by farmers for swine food, or contracted for by the city for any purpose, and where there are facilities for ground filling by clean ashes, the rubbish continues to give serious trouble. The nuisances and difficulties that arise from dumping grounds where rubbish is deposited are previously referred to in this paper and are generally well known in all communities.

In several places there are erected a special form of incinerators for the disposal of light refuse, which on occasion many also include small amounts of household garbage and bodies of the smaller animals.

These furnaces are built with large primary fire boxes with special form of fire grates, with a secondary fire, and with intercepting vertical and horizontal baffles that detain flying light particles, and becoming incandescent, assist in destroying the smoke and inflammable gases from the primary fire. They are charged through large circular openings on the top, and admit long pieces of refuse wood through the front firing doors. These designs were first used by the writer four years ago at a United States navy yard installation, and since have been adopted in many places with several now under construction.

In some of the larger New England cities where the quantities of rubbish are large, there is introduced a picking belt driven by electric power from the street mains, by which power 50 per cent. to 65 per cent. of the refuse is recovered for market. These stations are built by the towns at very moderate cost, are taken over by contractors who pay pro rata for all salable portions and who operate the station. The revenue to the city more than pays all capital charges, and provides sinking fund that defrays the initial cost of construction.

Recovery stations of this kind are in use in Cambridge, Worcester, Brookline, Somerville, Springfield, and other places are securing ground with intention of building.

These small refuse recovery stations are a modification of larger plants, operating in several cities, and within their limitations of capacity are found to be quite as efficient and useful. By their agency the problem of disposal of light combustible refuse is satisfactorily solved, at a minimum of expense, and in most cases with a profit to the community.

ADVANTAGES AND DISADVANTAGES OF DAY AND NIGHT COLLECTION OF MUNICIPAL WASTE.

WILLIAM H. EDWARDS,
New York City.

Read before the Sanitary Engineering Section of the American Public Health Association, Colorado Springs, September, 1913.

The collection of municipal wastes, ashes, and garbage, is, because of its very nature, classed as a noxious trade. Being a necessary evil attending municipal life and activity, it calls for a serious consideration, not only to improve the efficiency and economy of its performance, but also to minimize so far as possible its objectionable features. While the character of the vehicle and the methods of loading and transportation have their particular bearing on the efficiency and economy of the work done, the time of the performance also enters into these items and also has a bearing upon the comfort and well being of those served. Whether the wastes are collected separately or mixed may involve the question somewhat, but as a matter of fact this item does not in any great measure enter into an argument as to the time of day when collection shall be made, as separate or mixed the materials are offensive and liable to cause a nuisance in spite of the asserted fact that the mixture is rendered innocuous by the moisture of the swill preventing the dust nuisance of the ash. For economic reasons the receptacles in which the householder places the ashes and garbage are set outside the building, preferably in an alley, if such exists, but otherwise in front of the building and in such a manner as to interfere as little as possible with the use of the sidewalk by pedestrians. In loading it has been suggested that to avoid nuisance the receptacles should be carried away without emptying into the vehicle, but those engaged in this work have not as yet found any economical method of doing this work in this manner so as to have an efficient and inexpensive result in the carriage and dumping. We, therefore, are forced to empty the receptacles into the vehicle and there is an unsightly performance here, as well as a nuisance attending the dust spreading and unpreventable spilling which can only be minimized by covers or other devices for that purpose. Receptacles should be covered, but as to swill, these covers are frequently removed by the animals trying to get at the edible contents. Where this occurs, flies are attracted and the sun has an incubating effect on the bacterial life which the material contains. The kind of vehicle used for transportation may be a subject for study so that it may be easily loaded and emptied and not an interference with traffic.

The character of the neighborhood where the work is performed also has its effect upon the subject. We may, therefore, summarize the comparative advantages and disadvantages attendant upon this operation of this work as follows: unsightliness of cans of ashes and garbage standing in front of buildings a particular disadvantage in the daytime and much less at night, though not wholly done away with because cans are placed out for the night collections when servants are about to retire, and in the summertime especially these receptacles are from an æsthetic point of view a great annoyance. The retention of the cover on the receptacle is easier in the daytime, and, therefore, is an advantage, in that the animals do not prowl and people who find pleasure in displacing the covers do not find it convenient when they are observed. In this regard, in such cases as do occur where by carelessness or malice the covers are removed, the day work has its disadvantage in the spreading by the wind of dust from the ashes or the generation of noxious odors by the sun's effect upon the garbage. At the best the receptacle is some obstruction to the pedestrians and, therefore, is a disadvantage in the daytime and much less so at night. Where receptacles are placed within an areaway there is considerable disadvantage in night collection owing to the difficulty which the collector has of seeing whether there is material to remove or not. Complaint was made by the drivers of New York's Department of Street Cleaning that at night the animals attempting to gain food from the garbage cans attacked them and they were at a disadvantage because of the darkness. The emptying of the receptacle into the cart or truck is necessarily attended by some noise, particularly so when both the receptacle and the cart are made of metal. This disadvantage is great at night and of very little importance in the daytime. The spreading of the dust from the ash is a disadvantage because of the discomfort caused to pedestrians. In this regard the night collection has great comparative advantage. The interference with regular traffic by vehicles whose work causes them to stop and start frequently and at times to cross the street is considerable and puts the day collection at a disadvantage as against the night collection. The noise of vehicular traffic, while of no disadvantage in the daytime, becomes of considerable importance during the sleeping hours. The effect of the intense heat of the sun radiated from the pavements in the summer time is a distinct disadvantage both as to men and animals in day collection, and is completely obviated in night collection. In the winter months the weather conditions do not operate adversely comparatively either day or night, but the fact that where a horse is cast at night, because of the slippery conditions the driver has no chance to receive help as he has in the daytime in getting the animal up on his feet, is a distinct disadvantage to the night work. The spilling of materials from the vehicles is disadvantageous in day collection and is of small comparative importance in night collection as arrangement can be made for the sweeping up of the

litter before the use of the streets in the daytime makes it a nuisance. When the materials collected arrive at the dumping points there is a charge to be made as an economic disadvantage for the necessary lighting which must be particularly noted to prevent accidents. During the whole process of collection the one particular disadvantage of the night work comes from the fact that supervision of the work is made considerably more difficult than where the supervising officer has the advantage of broad daylight. I think I have covered the various items necessary to make a comparison of the advantages and disadvantages of day and night collections and, while in my balance of the one against the other so far as the city of New York is concerned, I am convinced that night collection should be chosen, I am equally certain that these considerations have to be weighed in the light of local conditions. New York, while it contains the details of about every kind of city conditions, has a combination of them which exists in no other city to such an extent, and, therefore, the importance of one or another of the items here noted does not bear a general relation to the work of other cities. In this as in most matters of municipal business we can only assist each other by relating experiences, leaving the application to individual cases to be made by the individual, and I feel that the narration alone is beneficial and I trust that in this case my rough sketch of the subject here discussed may prove of assistance to the members of this body and through them to those others who have this problem to meet.

RECOVERABLE VALUES OF MUNICIPAL WASTE.

GEORGE H. NORTON,

Deputy Engineer Commissioner, Buffalo, N. Y.

Read before the Sanitary Engineering Section of the American Public Health Association, Colorado Springs, September, 1913.

The disposal of the wastes of human activities is vital to the continuance of these activities and of the race itself. It is one of the sanitary problems which must be considered collectively with the great number, that the most beneficial effects may be attained from the available resources.

The decision of choice for disposal of refuse between immediate and complete destruction by fire and that of partial utilization of available portions must rest upon two factors: sanitary advantage of immediate destruction and commercial returns from utilization. When these two factors are known, then decision can be intelligently made between sanitary desirability and its attendant expense. If the public health can be better served by the determined extra cost of immediate destruction than by the same investment along other lines of health service the destruction must be adopted.

That in the consideration of this subject there may be available reliable data on recoverable values of certain municipal wastes, the following facts are submitted from the experience of Buffalo, N. Y.

The collections of wastes are divided into three classes:

Domestic Garbage;

Coal Ashes;

Refuse, being all other domestic wastes.

The refuse consists of paper, tin cans, bottles, old furniture and with some metal, rags, rubber, etc.

Collection is made by contract and the refuse is delivered by the contractor at the Municipal Plant situated about one mile from the center of the city. This plant was originally constructed by a previous contractor on city property, subsequently acquired by the city, remodeled and now consists of two forty-ton Heenan-Froude furnaces, fed from storage bins by a conveyor belt. Access by teams is over an elevated roadway where wagons dump into storage bins; the refuse is drawn from their bottoms onto a conveyor belt which passes up an incline through a picking and sorting room where recoveries are made and the remaining refuse passed to the furnaces. Each furnace has a 120 H. P. water-tube boiler placed over it. The steam generated is used to operate and light the plant and to operate sewage pumps in an adjoining building. In figures here given,

REFUSE UTILIZATION PLANT, BUFFALO, N. Y.
ALL WEIGHTS IN NET TONS.

Month.	Material received.			Salable recovery.								Sent to dump.			
	No. of loads.	Cubic yards.	Weight.	Paper baled.			Flour bags.	Charcoal bags.	Rags.	Tin cans.	Total weight.	No. bottles.	Furnace residuum.	Non-combustible.	
				Mixed.	Manilla.										
1912															
July.	1,329	22,316.8	1,482.5	189,466	325,132	25,345	0.175	0.135	10,530	25,725	576,508	12,290	215.9	32,615	
August.	1,279	20,986.8	1,395.4	136,060	374,677	20,160	0.175	0.225	6,885	16,450	554,632	12,845	200.9	30,698	
September.	1,129	21,161.3	1,407.0	162,193	339,137	23,810	.....	.....	7,025	8,750	540,915	12,005	207.2	30,954
October.	1,300	25,924.4	1,723.7	206,490	364,136	27,040	0.435	0.282	7,275	16,500	622,159	13,060	263.3	37,921	
November.	951	18,936.9	1,259.1	158,062	287,435	24,282	0.357	0.255	5,772	18,900	495,064	19,366	181.7	27,700	
December.	1,100	21,182.3	1,408.4	155,823	290,367	27,282	0.400	0.190	6,185	33,050	513,298	18,371	214.0	30,984	
1913															
January.	1,256	24,969.4	1,660.2	181,579	321,897	28,025	0.455	0.410	7,592	35,300	275,259	17,381	259.9	36,524	
February.	1,095	18,628.5	1,238.6	135,324	249,102	26,277	0.465	0.350	5,760	34,500	451,689	14,019	188.2	27,249	
March.	1,164	22,538.9	1,498.6	147,840	325,897	28,942	.....	.....	5,907	53,950	562,037	12,150	224.4	32,969
April.	1,272	28,363.9	1,885.9	178,335	401,937	28,407	0.490	0.277	6,490	45,050	660,987	21,143	293.2	41,487	
May.	1,612	34,613.6	2,301.4	264,645	460,617	40,972	.....	.....	6,040	35,925	808,200	10,925	359.3	50,630
June.	1,486	39,883.4	1,986.9	226,350	400,890	28,310	.....	.....	3,810	32,050	659,360	23,830	318.0	43,711
	14,973	289,506.2	19,247.7	2,142,167	4,141,134	328,852	2,952	2,124	79,271	325,650	7,020,108	194,385	2,927.0	423,444	

credit is given the refuse plant at 70 cents per hour for steam furnished the sewage pumping plant. Pickers or assorters are stationed on each side of the elevated belt, each recovering some designated material. Waste paper is assorted into various grades, depending on market demands, thrown into iron bins and on the floor below is pressed into bales. Tin cans are placed in storage bin and thence spouted into cars. The ash, clinker and non-combustible material is hauled to dumps.

Since July 1, 1912, all delivery to plant is weighed and record made of cubic contents of wagons. The table shows the records by months for the year July 1, 1912, to June 30, 1913, as taken from monthly statements and may vary slightly from official consolidations when made.

From this the following deductions are drawn:

Average load of refuse, cubic yards.....	19.3
Average weight of load, tons.....	1.29
Average weight per cubic yard, tons.....	0.066
Average refuse per year, per inhabitant (445,000 population), tons.....	0.043
Per cent. of total weight recovered.....	37.0%
Per cent. of total weight, non-combustible.....	2.2%
Per cent. of total weight, furnace residium.....	15.5%
Per cent. of total weight burned in furnace.....	45.3%
Sale value per ton refuse received, exclusive of steam value.....	\$2.12
Sale value per ton refuse received, inclusive of steam value.....	\$2.36
Labor cost per ton refuse received.....	\$1.78
Labor cost per ton refuse recovered.....	\$4.80

In the above, weight of bottles at one pound each has been added to recovered weights and \$1,000 added to pay roll for proportion of superintendent's salary.

During this year reconstruction and re-arrangement of the plant have been under way and a part of the labor charge might well have been charged to construction account. For one week the plant was shut down for such alterations. It should also be stated that the plant is practically complete for the incineration of garbage with the refuse, entailing extra construction costs.

FINANCIAL SUMMARY.

Sale of recoveries.....	\$40,877.29	
Steam sold.....	4,565.58	
		<hr/> \$45,442.87
TOTAL RECEIPTS.		
Pay rolls.....	\$33,160.85	
Part salary of superintendent.....	1,000.00	
Maintenance and repairing.....	3,523.07	
Residium to dumps.....	1,872.00	
		<hr/>
Operating expenses.....		\$39,555.92
		<hr/>
Net profit from operation.....		\$5,886.95

No computation is here made of charges for interest, depreciation and insurance, but the same may be inferred from the following:

Valuation of plant.....	\$135,000.00	
Valuation of land	25,000.00	
Total valuation.....		<hr/>
		\$160,000.00

Not all of the available steam is utilized.

From the above it may be seen that disposal of refuse, with recovery of materials of value, may be made without material cost near the center of a large city, thus saving the cost of extra haulage to unsightly dumps. Disposal by complete combustion could not thus be made unless arrangements for sale of steam in irregular supply were of an unusually favorable nature.

This is done without nuisance and without material complaints of injurious effects upon the health of those engaged in this work. This subject of effect upon health may well be the subject of further detailed investigation.

COST OF INCINERATION.

P. M. HALL,
Minneapolis, Minn.

Read before the Sanitary Engineering Section of the American Public Health Association, Colorado Springs, September, 1913.

At the meeting of the American Public Health Association held in Richmond in 1909, the subject of my paper was "Utilization in Connection with Incineration." In the course of the paper it was predicted that we would be doing street lighting and furnishing electric power for general purposes. Minneapolis has since developed the plan as outlined at that time and something of the process of evolution may be of interest.

Beginning in 1908 the incinerator furnished sufficient power to generate electricity for the lighting of Hopewell Hospital and the workhouse buildings. Later in the same year the heating of the same buildings was taken over. This service has continued up to the present time. In May, 1912, we began the systematic lighting of public streets.

At first this light was extended to include twenty-two miles of the city's streets. This has been gradually extended until now the street lighting includes thirty-one miles of streets.

At the time the crematory began to do street lighting, the city was paying to the Minneapolis General Electric company \$70 per arc light per year. The crematory furnished the service from the start for \$60. As a result of this competition, the rates of the General Electric were cut first to \$65 and since to \$62.50.

Herewith is submitted the figures of the cost of operation of the plant, and the receipts, for the year 1912:

CREMATORY, 1912.

Payroll.....	\$16,302.10
Water.....	142.89
Wood (146 cords).....	401.50
Coal in incinerators.....	3,621.93
Coal in high pressure boilers.....	5,243.73
Insurance.....	502.50
Supplies.....	2,647.86

Total Expense	\$28,862.51
---------------------	-------------

Revenue from B. of C. & C. Heat,	\$6293.89	
Revenue from B. of C. & C. Light,	1080.62	
Revenue from Street Lights,	4657.48	12,031.99

Net Expense	\$16,830.52
-------------	-------------

Total number of tanks burned, 13,496, making an average cost per tank of \$1.25.

We only had 150 arcs on for 5 months and 200 on for 6 months in 1912, which cut present revenue more than half. There is an additional revenue which should be credited to this department of \$500, as the city is paying \$62.50, and has been paying \$65 until lately, while we are furnishing it for \$60.

It will be noted that the service of street lighting covered a period of only six months, and of 150 arcs for that time. At the present time the city is maintaining 212 arcs, at the same rate of \$60 per year. This will give for the year 1913 a revenue of \$12,720, an increase over the revenue from the same source for the year 1912 of over \$8,000, estimating that the revenues for heating and lighting the group of workhouse buildings and the tuberculosis hospitals will be approximately the same this year as last. The revenues for 1913 should be a trifle over \$20,000, an increase of \$8,000 over the total revenues for 1912. Providing the cost of operation is not materially different, the net expense should be cut in two for the year 1913.

The city at the present time is putting in an additional incinerator and boiler and when completed the service of street lighting will be still further extended.

These figures give simply the net saving to the city from the operation of the incinerator. The service of electric lighting done by the garbage incinerator should in justice be credited with the saving to the city through the reduction of the rates of the general electric company. This alone runs into many thousand dollars. The cost of producing the arc light has been about \$46 per year, so that if necessary the cost to the city could be reduced to \$50 and still be a paying investment.

REPORT OF COMMITTEE ON REFUSE COLLECTION AND DISPOSAL.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

The chief work of the Committee on Refuse Collection and Disposal during the past year has been to make a preliminary trial of a proposed "Standard Form for Statistics of Municipal Refuse." This standard form was prepared by the chairman and was published in the *AMERICAN JOURNAL OF PUBLIC HEALTH* (Vol. 2, No. 6). The method of making the preliminary trial was determined after a meeting of the committee in New York. At this meeting subjects for a topical discussion at the convention were discussed and a program adopted. Col. William F. Morse undertook to prepare a paper on "Refuse Collection" to be presented at the convention.

In order to give the standard form for statistics a trial, seventy-five copies were sent out to the proper officials in the larger cities of the United States.

These cities were chosen because some member of the committee had a personal association with the official in charge. In each instance personal letters accompanied the copy of the standard form. These letters explained the nature and purpose of the standard form and requested that the form be filled out and returned to the chairman of the committee. Of the seventy-five cities to which copies were sent out, eight (10.6 per cent.) replied. Of these eight, only five returned the standard form made out as requested. These five cities were Washington, D. C., New York, N. Y., Chicago, Ill., Milwaukee, Wis., and Salem, Mass. Of the five forms received from these cities, two were incomplete, so that, out of seventy-five copies of the standard form sent out with personal letters, 6.7 per cent. made complete returns.

The city of Boston sent a copy of the sanitary service records from their annual report, which give very complete data of the refuse collection and disposal, but not in a form directly comparable with other cities. The city of Albany submitted a copy of a special report on refuse collection and disposal, which did not give current data as called for by the standard form. Mr. E. R. Conant, city engineer, Savannah, Ga., sent a very comprehensive letter, stating that no regular records of refuse disposal were kept and that he had collected as much information as possible during the short time he had been in office. This information was given in his letter. His attitude is expressed by the following sentence from his letter: "I am very much interested in your effort to have better data concerning the collection and disposal of municipal refuse, and, with the construction and operation of our incinerating plant, I shall take pleasure in carefully

compiling such data that will comply with the standard form which the American Public Health Association is preparing."

The city engineer of Rochester wrote that he was going to send in the Rochester data, but it has not come in time to be included in this report.

The data from the standard forms received has been summarized in the accompanying tables and notes. It is, of course, disappointing that more cities did not reply to our request. Nevertheless, the data as collected is full of value and interest, and in our judgment warrants a further trial of the form during the coming year, when possibly a second appeal will secure more results than the first.

Respectfully submitted,

SAMUEL A. GREELEY, *Chairman,*

WILLIAM F. MORSE,

JOHN H. GREGORY,

R. H. THOMPSON,

Committee on Refuse Collection and Disposal.

SUMMARY OF DATA.

1912.

A. STATISTICS OF REFUSE.

Unit Quantities.

City.	Population.	Garbage.		Ashes.		Rubbish.	
		Pounds per Cap- ita per Year.	Pounds per 1,000 Popu- lation per Day.	Pounds per cap- ita per Year.	Pounds per 1,000 Popu- lation per Day.	Pounds per Cap- ita per Year.	Pounds per 1,000 Popu- lation per Day.
New York.	4,743,773	144	393	1,162	3,175	89	244
Chicago.	2,307,638	103	331				
Boston.	686,000	204	656	975	3,120	24	77
Milwaukee.	392,381	181	497				
Washington.	331,069	273	876	825	2,640	58	187
Salem.	45,000	267	733				

Average Weights per Cubic Yard.

City.	Garbage.	Ashes.	Rubbish.
New York.	1,100	1,100	133
Chicago.	1,250	1,125	
Boston.	1,350	943	259
Washington.	1,150	1,200	171

Mechanical Analyses—Percentage by Weight.

City.	Glass.	Bones.	Paper.	Rags.	Metals.	Straw and Wood.	Dust.	Ashes.	Garbage.
<i>Chicago :</i>									
Ashes and rubbish	1.9	0.5	21.7		3.7	9.0	14.4	32.6	16.2
<i>Washington :</i>									
Ashes . . .	3.0	1.0	9.0	3.0	7.0	2.0	8.0		
Rubbish.			96.0	2.0	1.0				

Chemical Analyses, Washington, D. C.

Ashes contain 61 per cent. carbon and 6 per cent. water. Garbage contains 3.75 per cent. of grease and 15 per cent. of tankage.

B. STATISTICS OF HOUSE TREATMENT.

New York.

Size of house can?	Maximum three cubic feet (22.5 gals.).
Type of house can?	Metal.
Number of cans?	At least two.
Location of can?	Inside premises.
Is can set out for collector?	Yes.
Number of separations?	Three.
Is the garbage drained or wrapped in paper?	Neither.

Chicago.

Size of house can?	Five to ten gallons.
Type of house can?	Metal with metal cover.
Number of cans?	One for each house, flat or tenement flat.
Location of can?	Rear end of lot or in alley.
Is can set out for collector?	Yes.
Number of separations?	Two.
Is garbage drained or wrapped in paper?	No.

Milwaukee.

Size of house can?	Average ten gallons.
Type of house can?	Galvanized iron.
Number of cans?	One for each family.
Location of can?	In rear of yard as near alley as possible.
Is can set out for collector?	No.
Number of separations?	—
Is garbage drained or wrapped in paper?	Wrapped in paper (generally).

Washington.

Size of can?	Garbage three 10-gallons; ashes, ten 24-gallons; miscellaneous refuse, a suitable receptacle which can be easily handled by one man.
Type of house can?	Metal, water-tight with cover.

Number of cans?	Two, one for garbage and one for ashes.
Location of can?	At alley gate or in front area way.
Is can set out for collector?	Householder is required to open gate or door and to have refuse at the opening.
Number of separations?	Three.
Is garbage drained or wrapped?	Is drained but not wrapped.

C. STATISTICS OF COLLECTION.

Is collection done by city or by contract?	New York—by city. Chicago—by city. Boston—by city and contract. Milwaukee—by city. Washington—by contract. Salem—by city.
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Does the city own the stables and equipment?
New York is the only city that answers yes.

Number of Collections per Week.

City.	Summer			Winter		
	Business.	Residential.	Outlying.	Business.	Residential.	Outlying.
New York:						
Garbage	6	6	2	6	6	2
Ashes	6	6	1	6	6	1
Chicago:						
Garbage	6	3	2	6	3	1
Ashes	6	3	2	6	2	1
Milwaukee:						
Garbage	3	1	1	3	Every 10 days.	
Ashes		Monthly			Monthly	
Washington:						
Garbage	6	6	3	6	3	2
Ashes	None	1	1	None	2	1

Type of Collection Wagons Used.

City.	Garbage.	Ashes.	Rubbish.
New York:			
Capacity, cu. yds.	1.5	1.5	7.5
Material	Steel	Steel	Wood
Number of Horses	1	1	1
Attendants per wagon	1	1	1
Covered	With canvas		None
Maker	Sing Sing prison		
Cost	\$123	\$123	\$123

Type of Collection Wagons Used.—Continued.

City.	Garbage.	Ashes.	Rubbish.
<i>Chicago:</i>			
Capacity, cu. yds.	4.0	5.0	5.0
Material.	Iron	Wood	Wood
Number of horses.	2	2	2
Attendants per wagon.	2	1	1
How dumped.	Derrick	Hand	Hand
Covered.	Iron	Canvas	Canvas
Cost.	\$225	\$172	\$72
<i>Milwaukee:</i>			
Capacity, cu. yds.	2.0	3.0	3.0
Material.	Iron	Wood	Wood
Number of horses.	1	2	2
Attendants per wagon.	1	1	1
How dumped.	Crane	Hand	Hand
Covered.	Yes	No	No
Cost.	\$60		
<i>Washington:</i>			
Capacity, cu. yds.	2.0	3.0-4.0-5.0	8.0
Material.	Steel	Wood	Wood
Number of horses.	1	2	1
Attendants per wagon.	1 or 2	2	1
How dumped.	Removable Bodies	Bottom	Material lifted out.
Covered.	Steel covers	Canvas	Canvas
Cost.	\$150	\$140-\$185	\$125

Boston.—Capacity of wagons used: Single ash carts—63 cubic feet. Double ash carts—145 cubic feet. Paper carts—167 cubic feet. Paper wagons—288 cubic feet. Single garbage wagons—54 cubic feet. Double garbage wagons—81 cubic feet.

Frequency of washing wagons?

New York—Daily. Chicago—Weekly. Milwaukee—Daily. Washington—Daily. Salem—Daily.

Number of Wagons in Service.

	Summer.			Winter.		
	Garbage.	Ashes.	Rubbish.	Garbage.	Ashes.	Rubbish.
New York.	Average number of wagons in service, 1469.					
Chicago.	205	340		150	550	
Milwaukee.	106	26		90	125	
Washington.	85	30	30	65	75	30

Cost of Collection per Ton.

City.	Garbage.	Ashes.	Rubbish.
New York.....	\$0.97	\$0.73	\$2.46
*Chicago.....	3.94	0.639	per cu. yard
Boston.....	2.99	1.34	\$2.71
*Milwaukee.....	2.47	0.78	per cu. yard
Washington.....			
(includes disposal).....	1.04	0.60	\$1.71

*Ashes and rubbish collected together.

D. STATISTICS OF DISPOSAL.

Methods of Disposal.

City.	Garbage.	Ashes.	Rubbish.
New York.....	Reduction	Dumped	Dumped after picking
Chicago.....	Reduction	Dumped	Dumped
Boston.....	Reduction	Dumped	Dumped
Milwaukee.....	Incineration	Dumped and incinerated	
Washington.....	Reduction	Dumped	Incineration, dumping and sorting
Salem.....	Fed to pigs	Dumped	Dumped

SANITARY ASPECTS OF DISPOSAL.

New York City. The cost of disposal of ashes and rubbish is given as thirty-four cents per ton. The reduction plant, located on Barren Island, is an Arnold process type of plant and handled 345,900 tons in 1912.

Milwaukee. Ashes and rubbish are dumped on about twenty dumps throughout the city. The main dumps are constantly leveled. The cost of disposal is given as seventy-eight cents per cubic yard, which apparently includes the collection. At the incinerator, which is of 300 tons daily capacity, fifty-seven men are employed. The gross cost per ton is \$1.17 per ton. The plant cost \$210,000. Steam generated is "being harnessed to run power plant." Clinker is dumped.

Washington. The area of available dumping grounds is practically unlimited. Public dumps have care takers. The reduction plant is located at Cherry Hill, Va., and utilizes the Chamberlain process. The quantity reduced in 1912 was 48,214 tons. The force employed varies from seventy-five men in summer to sixty men in winter. The gross cost of operation is estimated to be \$2.31 per ton and the revenue per ton is

estimated to be \$4.20. There is one plant for burning rubbish with a capacity of 450 cubic yards. The location is 26th and Bemings Avenues, Washington. The plant consists of a furnace and picking conveyor. Thirty men are employed and seventy-five women. The plant cost \$40,000. The gross cost of operation is estimated at \$3.09 per ton, and the revenue at \$4.28 per ton.

Salem. The garbage contract is let for a period of five years for a lump sum of \$12,500 at the piggery. One hundred and fifty pigs are kept in the summer and 200 in winter.

E. MISCELLANEOUS STATISTICS.

DISPOSAL OF MANURE.

New York City. Manure is kept in pits at the stables. It is removed by contract and sold to farmers. There are loading stations in the city used for all classes of refuse.

Chicago. Manure is kept in boxes or vaults. It is removed privately and shipped out of city by steam roads. There are two loading stations in the city for transferring garbage boxes from wagons to barges, and two for loading rubbish and street dirt from wagons to cars.

Milwaukee. The manure is kept in boxes. It is removed and disposed of privately. The steam railroads maintain a car in the city for the removal of manure.

Washington. The manure is kept in pits and is removed privately, generally for fertilizing. There is a transfer station in the city for garbage.

Salem. Manure is kept in a bin at the stable and is sold to a farmer in Danvers. There is a loading station in the city for garbage.

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SANITATION AND POLITICAL ECONOMY.

The greatest asset of the modern public health movement is public confidence. Almost all enterprises looking toward public benefit have clinging to them features of more or less dubious wisdom or promise, but the promotion of the public health is acknowledged to be so pressing and so important that to it are cheerfully given extraordinary prominence and support. There are some signs in the sky, however, that this attitude of cheerful acquiescence in and ready submission to the mere dictates of sanitarians will not be continued indefinitely, but that cause must be shown for sanitary ordinances, expenditures and improvements. The famous "dip tank" decision of the Massachusetts courts, and the general insistence everywhere on "the rule of reason," are straws showing which way the wind is blowing.

But if public confidence is the best asset of sanitation, then it should be jealously guarded lest it be abused or weakened. It may be damaged, for example, by the extravagant claims of enthusiasts—as for example in hold-

ing out the hope that tuberculosis may actually soon disappear—or by the activity of pure food apostles who place food purity at the head of the list of all sanitary endeavors.

Politics mixed with sanitation makes an especially dangerous compound, though sanitation has often been used as a highly effective political club. Just now it seems to be political economy which is seeking a partnership with sanitation, but according to a recent author this seems likely to prove sometimes merely another cloak to cover up things which, without the magic name of Sanitation, would not be tolerated. In particular, the benefits of improved housing and the cheapening and bettering of food supplies under state and municipal supervision have many ardent advocates. On the other hand, a severe critic of these associations of politics and sanitation may often find much to say, as does for example, Mr. Ives Guyot, an eminent French political economist whose recent book entitled "Where and Why Public Ownership Has Failed" (Macmillan) contains some chapters of lively interest for sanitarians, on the Housing of the Working Classes in Great Britain, and on the Continent, under public ownership, and on Government Control of Food Supplies. Space forbids a review of this distinctly partisan and possibly prejudiced criticism of much that ordinarily passes as excellent public health service. Those, however, who like to know both sides of an important subject or to look before they leap, will not fail to make a note of this critical volume.

PLACE OF THE ENGINEER IN PUBLIC HEALTH.

That the place of the engineer in health work is widening has new and striking evidence in the selection of a man with a B. S. from a technical college for director of the Children's Hospital in Philadelphia.

Just as it was formerly the custom to select a minister for the president of a College, so it was the rule to place a physician at the head of everything that bore the name of health. Such a man was over every health department, looked after the manifold utilities of kindred nature, suggested better sanitary methods and cared for the vital statistics. Today the up-to-date college looks for some cultured man skilled in business for its head. In a comparable way the sanitary engineer is chosen to high places in health work. He is a man who first of all is an engineer and competent to take up the engineering side of sanitation, but at the same time broad enough to have gained some knowledge of medical principles.

There are certain good reasons for the evolution, for health work no longer stands on the basis of medicine alone. Light, ventilation and humidity come into the problems of health; construction is most important, and in these matters the value of the engineer is obvious. Health administration never can be independent of medical skill and practice—medicine and engineering must go hand in hand.

Coöperation of all possible resources, medical and non-medical, is what counts in preventing unnecessary sickness and premature death. It is worth striving for!

JULY 1914

SECURING FUNDS FOR PUBLIC HEALTH WORK.

LAWRENCE VEILLER,
Secretary National Housing Association.

Read before the Sociological Section, American Public Health Association, Colorado Springs,
September, 1913.

Is it really impossible to get from the public treasury sufficient funds for public health work?

If this question were put to vote among the health officers of the country the answer would undoubtedly be unanimously in the affirmative.

If we should further attempt in true scientific manner to reach a conclusion, based on a careful and dispassionate analysis of the appropriations made to the various health departments throughout the country, we should unquestionably be driven to a similar inference.

No one, we imagine, could escape this conclusion after studying carefully the records; after seeing health officer after health officer certify to the needs of his department, setting forth clearly and explicitly what the interests of the community require, and the consequences of failure to meet these community needs, and then finding how totally inadequate an appropriation has been made by the public authorities.

And yet, I am going to venture, though a mere layman, to point out that this seemingly impossible result can be obtained, if the right methods are pursued. I happen to know that this can be done, because we have done it—not once, but many times.

Like most other things it depends on using the right methods. Nothing is impossible, if you know how. The most impregnable fortress will yield to the besiegers, if the right instruments of warfare are brought to bear.

As illustrative of what can be accomplished in this direction, some work done by the writer of this paper four years ago in New York City may prove suggestive and possibly helpful to health officers and to social workers in other cities.

In my capacity as chief executive officer of the Committee on the Prevention of Tuberculosis of the Charity Organization Society, the body of private citizens that is carrying the responsibility for the fight against the great white plague in New York City, I reached the conclusion that it was about time that we took account of stock; that we try to reach some determination as to how far our efforts were accomplishing the ends for which we had been working.

Our committee had at that time been actively at work for some eight years, as we were practically the first group of people in the United States,

outside of the health authorities, to take up the prevention of tuberculosis in an organized way. At the very inception of our work we had enunciated the principle that we, as private citizens, ought not to undertake functions which it properly belonged to the public authorities to perform, but that it should be our task to see that the public authorities performed these functions, and that they were given the means with which to do it. For instance, we felt it no part of our business to build and operate hospitals for advanced or incipient cases, to run tuberculosis dispensaries, to disinfect infected domiciles, or to exercise control over the consumptive poor in their homes; these things it was the business of the city to do. But we felt it to be very much our business to see that these things were done; it was our function to promote the organization and maintenance by the city of adequate tuberculosis hospitals and clinics, to see that the city required the prompt and frequent disinfection of infected houses and apartments, and to see that the board of health exercised adequate control over the consumptive poor in their homes.

Although the committee had at that time been carrying on an active educational campaign for some seven years and the board of health had never been so active in its anti-tuberculosis work, yet the death-rate remained practically stationary during that period, in rather striking contrast to a very decided decrease in the years prior to the inception of these various movements. It seemed an especially opportune time, therefore, all things considered, to see where we were heading.

Accordingly, we had a talk with the heads of the health department, including the chief of the bureau affected, and explained that we desired to make a *sympathetic* study of the tuberculosis work of the department.

Permission was readily granted. In fact, we were welcomed with open arms. All records were thrown open to us.

Then we began to study at first hand the system of the department. The plan of operation was explained to us in detail by the chief of bureau, until we had completely grasped the mechanism that was being used, and were able to operate it ourselves.

The department at that time, as it does today and has always done, led the country in its methods of anti-tuberculosis work. It had an excellent system but much of it was on paper. Through years of effort, registration of tuberculous cases had been perfected and an impressive card catalogue met our eyes. That catalogue would have been all right, if we hadn't been so impertinent as to *study* it!

It was an effective sight, as a passing impression, but alas, it couldn't stand very searching analysis. It was all right until we commenced to ask questions. Looking through the cards casually we came upon the record of the case of one Annie S——, who was supposed to be living in an East Side tenement house, and had been reported to the department as

having tuberculosis on November 9, 1903, some six years previous. With a glow of pride we noted how promptly the department had acted. Quickly and with despatch on November 12, two days later, an emissary from the department, nurse or doctor, had visited the case.

Then our pride had a fall. The patient happened to be out when the nurse called, certain facts about her were obtained from neighbors and relatives and placed upon the records, but the patient was not seen.

Glancing down the record we assumed that we should soon come upon the record of a subsequent visit made, perhaps a week later, when the patient was at home and when first-hand information would be obtained, and instructive advice given to the patient. But alas, the records showed that no subsequent visit had ever been made. Our first thought naturally was that this was an exceptional case, that through some oversight the card had been misplaced, and the system thrown out of gear. But further study showed that the catalogue was *full* of cases like that of Annie S——; that there were literally hundreds of cases that had been visited but once in several years.

More detailed study soon disclosed the fact that this had practically become the rule, that all cases were visited once when originally reported to the department, and then, except in special cases, were never seen again. No one knew what the present condition of the patient might be. So far as the department was concerned, she might have gone on for years infecting her family and those around her.

By this time we were naturally beginning to ask ourselves, "what was the value of requiring physicians to report cases, if, after they were reported, nothing more than this happened?" Our disillusionment had begun.

Our next serious shock was when we came upon a separate file of 20,000 "Not Found Cases"—cases which had once been reported as having consumption but who could not be found at the address given. The thought of 20,000 "lost" consumptives wandering around the city, spreading the disease wherever they went, was not a cheerful one to contemplate.

Then we proceeded to study the important question of house infection. Here we felt sure we were on safe ground. The department ten years before had made a series of most impressive and valuable maps showing the recurrence of tuberculosis in certain houses, and we felt confident we should find the most complete data on this phase of the problem.

Notwithstanding this, I must frankly admit that we approached the question of the disinfection of apartments formerly occupied by consumptives, with some trepidation. But as we read the "sanitary code" our hopes rose, for there we found it plainly set forth that whenever a person suffering from tuberculosis moved from an apartment, it was incumbent on the landlord to notify the health department of this fact and to thoroughly renovate and disinfect the apartment.

Alas! this too was on paper. When we came to insert our inquisitive probe, we found that this section of the code was "not enforced"; that no attempt was made to force landlords to comply with this requirement; that the department required disinfection or renovation only in cases where the patient *died* in his tenement home and that in the thousands of other cases, where sick consumptives moved from one house to another, nothing was done about it. A new family might move into the infected rooms, entirely ignorant of the fact that the rooms had just been vacated by a consumptive and that they were infected with the germs of that dread disease.

Our disillusionment was now complete. We now understood fully why the tuberculosis death-rate had stayed practically stationary during the past seven years.

A situation both unanticipated and serious had been disclosed by our two weeks' study. Vitally important measures which the city was supposed to be taking, and which it was most necessary should be taken, were found to be left undone. It was found that thousands of the consumptive poor of the city remained unsupervised and untaught in their tenement homes, spreading the disease throughout the community; and that thousands of these homes had become permanent centers of infection because of the absence of proper disinfection. It was found that there were over 44,000 consumptives in the city and that over 28,000 of these were unsupervised, under the care neither of private physician, nor of hospital or clinic; that over 20,000 consumptives whose whereabouts were at one time known to the department, were now adrift and could not be found, each one a potential source of danger to the community. It was found that houses occupied by consumptives were vacated; then occupied anew by other families who in their turn became infected and succumbed to the disease, and that no effort was being made by the city to prevent this.

The reasons for the conditions discovered were not far to seek. They resolved themselves in each case into one brief and cogent expression—"lack of funds." The things which had been left undone that ought to have been done, were not done simply because there were not funds enough to make it possible to do them. The department had literally been trying to lift itself by its bootstraps. It had been attempting to supervise 28,000 consumptives in their homes with but eight visiting nurses!

Not having to contend with an inert department or with officials who had failed to grasp the problem with which they were wrestling, greatly clarified the situation. We faced merely the fact that the department had not in the past been given enough money to enable it to do its work properly, and that, until it did receive a more adequate appropriation the city could not expect to reduce the death-rate from tuberculosis nor make much further progress in controlling this disease. This greatly simplified our task.

Our next step was to elaborate a plan for the proper control of tuberculosis by the health department, with a careful estimate of the increased staff necessary to carry out this plan. This was done and submitted to the health commissioner and his aides, who approved it and, at our suggestion, made it the basis of a request to the financial authorities for funds to be granted in the budget for the following year's appropriation. It represented an annual increase of over a quarter of a million dollars (\$263,500).

We then said to the health commissioner, "We are going to get you this money." For we knew that we, as private citizens, could campaign for it, where he as a public official, and part of the administration, was by his very position debarred from doing the things necessary to bring about this much desired result.

I don't think I shall ever forget the expression with which the head of the bureau affected, who for years past had been unsuccessfully trying to get small increases for the tuberculosis work of the department, greeted my statement that we intended to get him an increase of a quarter of a million dollars annually for his work. It was not what he said, but what he looked. Such an expression of condescending toleration I don't think I have ever quite seen—a thinly veiled amusement at the youthful enthusiasm that could venture on so wild a quest, with a calm certainty that the ambitious and fervent "reformer" would emerge from the experience very much as Don Quixote had emerged from his encounter with the windmills—a sadder and a wiser man! And, that so far as the department appropriation was concerned, the result would be what it had always been—the great needs of the department would be set forth but the appropriation would remain the same!

I spoke earlier in this paper of the importance of right methods as a factor in achieving success.

At this point, one false step would have been fatal. Had we been like some "reformers" and cared more for publicity and for getting the credit than for achieving results, we should have jeopardized the whole future of the tuberculosis movement in New York, through premature publicity—the graveyard of so many social movements!

We had to tread most carefully. We had just disclosed grave defects in the administration of the health department, which if not presented with sufficient care would have reflected seriously on the administration. Yet these defects of administration were the most potent weapon that could have been forged for our purpose. Rightly applied they were the lever that would pry open the lid of the city strong-box and give us the money so urgently needed.

Our task, therefore, was to persuade the head of the health department that instead of keeping silent about the defects of administration disclosed, he should permit us to give the widest publicity to our discoveries, and that

he himself should frankly admit these serious evils, but that, while deploring them, he should always point out that they were due to one cause—lack of funds. As the man at the head of the department was a big man, and had vision, it was not difficult to bring this about.

We then undertook a far-reaching campaign to secure from the Board of Estimate and Apportionment the increase in the department's appropriation of a quarter of a million dollars.

Every detail of the campaign was carefully mapped out; public sentiment was stimulated through newspaper editorials and discussions; personal interviews were had by members of the committee and by numerous friends of the society with the members of the Board of Estimate, urging that the full appropriation be made. Public meetings were held where the whole situation was made plain.

The most potent weapon in our fight, however, was a twelve page pamphlet, entitled "Tuberculosis Needs and the City Budget—Why the Health Department Needs More Money for Tuberculosis," copiously illustrated with full page photographs. In this we did not mince matters. The facts were handled without gloves, and were set forth in good newspaper English, in a way that not only compelled the reader's attention, but held it, like a "best-seller"; if he once took it up he couldn't put it down until he had finished it. And yet this was done without sensationalism and without exaggeration or overstatement. I wish I could embody that pamphlet in this paper, but I have some regard for the feelings of my auditors.

Some of the headings may, however, give some conception of the methods employed. I cite a few: "The Present Situation; Consumptives in the Tenements; 20,000 Consumptives whose Whereabouts Are Unknown; Thousands of Children Infected; Lack of Hospital Accommodations; The Obstacles to Progress; How the Situation Is to Be Met; and What Will be Done with the Money." We closed with a direct personal appeal as follows:

"HOW YOU CAN HELP."

"This situation vitally concerns you. It affects every citizen of New York. Tuberculosis is not limited to the poor. The danger from the careless consumptive affects every citizen. No one is immune. The prevention of this disease concerns the entire city. The public officials have set forth the needs of their department. They stand ready to do their part to stamp out the disease. They can, however, make but little progress unless they have the support of all citizens.

"If you believe that the money asked for, for this tuberculosis work, should be granted, we would ask you to write now to the members of the Board of Estimate whose names and addresses are given in this pamphlet, stating briefly your views and urging them to vote for the items in the

various appropriations mentioned on the following page; also to get as many of your friends as possible to write similar letters."

Appended to this pamphlet was a list of the members of that Board with their addresses, and a summary of the items in the various appropriations for which support was asked.

At the appropriate time, when the Board of Estimate was considering the departmental estimates, five thousand letters with this pamphlet were sent out to prominent citizens, asking their support. As a result, the members of the Board of Estimate were deluged with letters from some of the most important people in the city.

But valuable as this campaign of letter-writing was, it would not do to stop there. Our next step was to request a public hearing before the Board of Estimate. That hearing was most carefully organized. Fourteen speakers appeared to urge the appropriation. They comprised the very greatest physicians and authorities on tuberculosis in the city. Joined with them were representatives of organized labor, the Catholic church and other important social agencies. To each speaker was assigned a single point to make, but one phase of the subject to discuss, and no speaker was allowed to speak for more than three minutes. It has since been said by one of New York's least easily satisfied reformers that he had never seen so well organized a public hearing.

Satisfactory as the public impression created by this demonstration was, we did not stop there. We searched out the individual members of the Board of Estimate once more and found out who was for us and who against us. Only one member remained opposed to granting the full appropriation. But he was the most important member of the board. We labored with him night and day; we brought political and social influence to bear, and finally he yielded.

Our fight was won; we had secured the full appropriation that we had asked for. And the health department's fund for tuberculosis work was increased by \$263,500, at one step! As this was an *annual* increase, it, of course, would continue to be made to be in subsequent years. (It has been made every year in the four years that have since elapsed.) It was equivalent, therefore, in its practical effect to the granting of a fund of five million dollars, the income of which was to be devoted to the prevention of tuberculosis.

These results fraught with so much importance to the city and to countless thousands of its sick poor were achieved by the expenditure of \$385.96, but chiefly by knowing how.

I have never since talked this over with my friend, the bureau chief, in the health department who expected to see me emerge from the encounter like Don Quixote from the windmills, because I learned some years ago that in public life it is never wise to indulge in the luxury of saying "I told you

so"; but I have no doubt he still believes there was some sort of magic in it, a streak of luck that happens once in a hundred years!

This experience that I have related at such length is in no sense exceptional.

Five years ago, the Tenement House Committee of the Charity Organization Society undertook a similar campaign to secure, for another branch of the city government, the Tenement House Department, an increased appropriation of \$169,000. (In New York we have a separate department to look after housing conditions, because we have so many tenement houses—over 100,000 separate ones.)

Similar methods were employed. The conditions were studied; the needs set forth; a campaign of letter-writing and publicity carried out; public hearings organized, etc., with a similar result; the full appropriation sought for was secured, and great social reforms made possible thereby. As a result of that campaign 7,000 privy vaults were removed from New York's crowded tenement districts, and over 260,000 windowless rooms were made a thing of the past.

More recently on behalf of the Committee on Criminal Courts a similar campaign has been carried on. That committee is concerned with the better administration of the minor criminal courts of the city—those known as "police courts" in other communities.

An important part of our work has been the abolition of the fining of women of the street for soliciting and the commitment of the younger and more hopeful ones to reformatories. This winter our state reformatory at Bedford became greatly overcrowded, having to accommodate 50 per cent. more than its normal maximum capacity. Notwithstanding this state of affairs and the representations made by the officers to the state authorities, but \$50,000 was all that they would allow for new buildings, whereas \$150,000 had been asked for to meet the minimum requirements, and \$500,000 was really needed.

We were asked to help. A similar campaign to that described in this paper was promptly organized. This time with the legislature and the state authorities. With the usual results—instead of the paltry \$50,000 originally allowed, we succeeded in prying loose \$414,000 from the clutches of the watch-dogs of the treasury.

I would not have you think that there is any special magic that attaches to these efforts. Anybody can accomplish similar results if he will adopt similar methods. I know that others can do it, for others *have* done it. My friend Homer Folks has been doing it for years, in his field.

The moral of this plain tale from the hills is that the public official needs a "wicked partner!" Some one who will stand behind him and back him up, and do it all the time.

It is entirely possible to get all the money you need for public health work, but you must show the fellow who holds the purse strings that the people want it. Few health officers can do this; they cannot with propriety carry on a campaign of acceleration such as I have described here. But there are any number of able men and women who can do this, and who will contribute money and time and thought and civic patriotism unceasingly. All that is needed is to annex them to the public health movement. Mr. Health Officer, why not try it?

SECURING FUNDS FOR PUBLIC HEALTH WORK.

ALBERT G. MILBANK.

Read before the Sociological Section, American Public Health Association, Colorado Springs, September, 1913.

The recent gift of Mrs. Elizabeth Milbank Anderson in New York City of a fund amounting to \$650,000 to make possible the establishment of a Department of Social Welfare of the New York Association for Improving the Condition of the Poor for the express purpose of promoting various public health activities, is doubtless the occasion of the request of the chairman of the Sociological Section of this Conference to prepare this paper.

The very fact that a fund of this size has been given by Mrs. Anderson for public health work is an indication that the problem of conserving the health of the community is of growing importance in the minds of those who are interested in activities tending towards the promotion of public and social welfare. The benefactions for the relief of actual poverty and for the care of dependents of various types have for many years been enormous, and rightly so. Without, however, any diminution in the amounts contributed for these purposes there is apparently a growing tendency to larger benefactions for public health activities.

In this connection it is interesting to note that an analysis of the World Almanac list of contributors to educational, religious and public health purposes, for the year 1912, shows that of 220 donors of gifts of \$10,000 or over, 51 persons applied their gifts to religious purposes, 101 to educational purposes and 68 to more distinctly public health purposes.

This tendency toward a greater support of some of the activities tending to promote the public health of a community is, in my judgment, a tendency in the right direction. It grows out of an increasing consciousness of the fact that health is fundamental. In our religious and ethical work it is being recognized more and more clearly that a sound physical basis is one of the greatest essentials of a normal moral and religious life. To an even greater extent in our educational activities we are appreciating the fact that a well nourished and healthy body is a necessary preliminary to securing the best results of educational effort. Indeed, without health education is hardly possible. We find, accordingly, a rapidly increasing attention to the problem of the health of our school children. We find an increasing emphasis upon such problems as the medical care and treatment of school children. Medical inspection in our best public school systems is rapidly becoming more general and we are already tending to provide *medical care and treatment* for public school children, so that the term *med-*

ical inspection itself in our best schools is no longer adequately descriptive of the work done. It is only natural in this movement that individuals with means at their disposal and with an intelligent and sympathetic interest in the improvement of social conditions should be found giving largely to the promotion of activities directed toward improving the health and physical condition of school children.

There is also a growing recognition of the relation of public health to the economic development of the community. It is being realized more fully how fundamental is health to the economic independence of the family and of the individual.

In a recent classification of 6,060 dependent families which were given relief by one of the large relief organizations in the city of New York, it was found that in 40 per cent. of the cases the cause assigned, which forced the families to seek aid, was the lack of health. It is the general experience of relief organizations that this factor is more important than any other in causing the economic dependence of families.

We are thus growing more and more conscious of the fundamental importance of health, not only to education and economic independence but also to the happiness and well being of the individuals in society and also to life itself. It is, therefore, appropriate that private funds should rally to the aid and support of public health projects. Splendid examples of the tendency to do this are increasingly apparent. An appreciable proportion of the activities growing out of the magnificent Sage Foundation is devoted to the promotion of public health; the Rockefeller Institute for Medical Research, with its large resources, is devoted exclusively to the prevention of disease. Similarly the Rockefeller Hookworm Commission, with its large endowment, is devoting itself exclusively to the prevention of a single disease responsible for the lack of public health among a very large population of the country. Private associations of various kinds are springing up, which have as their object the prevention of disease and the conservation of health. The example has been set and should be copied widely. The motto used by the Board of Health of the city of New York on all its publications should dominate the thought of not only the tax-paying public but also that portion of the public with sufficient means to contribute to public health work. This motto, now so much quoted, is "Public Health is Purchasable." If public health is purchasable and is fundamental to social improvement, every possible effort should be made to interest the benevolent public to the end that the necessary purchase price may be secured.

The participation of Mrs. Anderson in the growing social self-consciousness of the fundamental importance of public health work, to which I have referred, led to the Milbank Memorial Fund for the purpose of promoting public health.

The appearance of two articles in one of the New York Sunday newspapers, one dealing with the problem of providing hot school lunches at cost and the other dealing with the ventilation of school buildings, stimulated the interest of Mrs. Anderson in these problems. Out of this grew a consideration of the problem how she could best contribute to a solution of the problems and this in turn led to a consideration of the relation of these problems to other public health problems. Gradually out of these considerations emerged the plan of the Department of Social Welfare devoted to a fairly wide range of public health activities.

In her letter of gift to the Association for Improving the Condition of the Poor, Mrs. Anderson says:

"In the first place I am particularly interested in fostering preventive and constructive social measures for the welfare of the poor of this city, as distinguished from relief measures affecting particular individuals and families. I fully appreciate the necessity for ministering to the physical needs of the sick, disabled and unfortunate, but in undertaking the work outlined in this letter I wish to make it clear that the proposed Department of Social Welfare is to concern itself, in so far as it employs funds supplied by me, with a social program based upon preventive and constructive measures.

"Generally speaking, therefore, this program should include those activities which are calculated to prevent sickness and thus relieve poverty, such, for example, as the promotion of cleanliness and sanitation and the securing of a proper food supply. In this connection your association will, doubtless, find it advisable in some cases, to coöperate with public authorities, and with existing agencies having similar objects in view where such agencies are practicing approved methods in fulfilling their purposes, while in other cases it may probably be necessary to establish the work of a new enterprise, and in still other cases it will perhaps be prudent to devote some time and money to investigation and research before assurances can be given that any proposed measure will accomplish the object sought to be attained."

To meet Mrs. Anderson's suggestion, the work of the newly created Department of Social Welfare has been organized under three bureaus: one devoting itself to matters pertaining to general activities relating to public health and hygiene; one dealing with matters pertaining to public health as applied to public schools, and a third dealing with problems affecting public health so far as it relates to food supply.

Under the first of these bureaus the necessity of cleanliness plays an important part in Mrs. Anderson's program. In 1904, Mrs. Anderson gave to the same association money to establish a public bath. This has been maintained as a model public bath since that time and has been very influential in extending the public bath idea in New York City. In a little more than a decade the city of New York has expended more than

a million dollars for the extension of public baths alone. There are at the present time twelve interior public baths in this borough alone and in addition the city maintains a number of floating baths. Mrs. Anderson's interest in the public bath situation may be seen from the following quotation from her letter of gift:

"Under the heading of Public Health and Hygiene I would expect that the Milbank Memorial Bath in East 38th Street be maintained in its present state of efficiency as a model bath, and that an active educational campaign be carried on for the purpose of inducing the city to maintain the same standard of economy and efficiency in respect of the baths operated by it and for the further purpose of demonstrating to the city the advisability of extending the public bath system in properly selected sections of the city, and generally to popularize the public bathing facilities so as to increase their usefulness to the utmost. Under this heading also I would favor equipping one of the typical floating baths with a modern and approved filtration device, which I am advised can be made available and which would eliminate the present chief objection to the floating baths as now conducted."

The relation of the house fly and other insect carriers of disease to public health is also included in the plans for the Bureau of Public Health and Hygiene. An experiment has been conducted during the past summer to determine the relation of the fly to disease, particularly diarrheal diseases in children. For the purpose of this study a group of nine blocks in the city has been selected. Through the coöperation of the Health Department and the Tenement House Department, a very rigid sanitary inspection of these blocks has been maintained during the summer and all breeding places for flies have been removed so far as possible. One block in the center of this district has been screened and, through the coöperation of the Boy Scouts, fly traps have been placed and operated throughout the district. In the screened block in the center of the district a careful inventory of the sickness in existence when the experiment began was made. Provision was also made for instructing the families as to the necessity of keeping all food from places accessible to flies and for killing off whatever flies succeeded in getting inside the apartments. A daily inspection of each family was maintained for the purpose of observing the morbidity and mortality of each family and the results carefully recorded. For the purpose of control, a similar block, located sufficiently far from the screened block to be outside of the zone of the district so carefully made sanitary was chosen in which daily inspections were made for the purpose of observing similarly the morbidity and mortality. As a result of this experiment it is hoped that some light may be thrown on the importance of exterminating the fly from the point of view of public health. This serves to illus-

trate the kind of activity which the Bureau of Public Health and Hygiene will carry on. This bureau is also making a study of the desirability of establishing public laundries in the city of New York and is considering the establishment of a model experimental laundry. Efforts will also be made to secure an extension in the number of public comfort stations and to secure more satisfactory sanitary conditions in those maintained by the municipality and semi-public corporations, such as the subway and elevated railways, department stores, etc.

The Bureau of Welfare of School Children will deal with problems affecting the public health of school children, that is, those problems relating to their general physical condition. The problem of school feeding is one of the large interests of this Bureau. The efficient work which has been conducted by the School Lunch Committee of the City of New York, is to be supported and enlarged and careful studies will be made of the relation of giving hot nourishing school lunches at cost to children, to their physical development and their capacity to do school work.

This bureau will, in addition, make one of its main problems that of effective medical care and treatment of school children. It will also endeavor, to the end that medical inspection may be readily effective, to secure adequate clinical facilities for remedying physical defects. These will include dental clinics and special clinics for eyes, ears, nose, throat and other defects. The importance of cleanliness in school buildings is included in the proposed activities of the bureau. Efforts will be made to determine the best methods of cleaning school buildings and every possible effort will be made to secure the improvements in cleaning school buildings which may be suggested by the results of such studies. The importance of preventing the possibility of carrying disease through contact with drinking facilities, including drinking cups and faucets, has led to a program to secure the installation of sanitary drinking fountains in each school. An effort will also be made to keep the school toilets in a sanitary condition. These are some of the activities which the Bureau of Welfare of School Children will undertake.

The Bureau of Food Supply has, during the summer, been conducting an inquiry into the extent to which short weighing, short measuring and deceptive quality is found in the food supply of the poorer sections of New York City. Typical sections of the city have been selected and the purchases of a very large number of families from all of the food supply stores in that district have been checked up for the purpose of ascertaining how general is short weight and deceptive quality. The bureau is collating all of the available information with regard to the itemized cost of retailing food supply. Data is in the hands of this bureau which show the cost of delivering food supply, the amount which must be added because of the credit system, the portion of the expense which goes to salaries and wages,

for rent and to other items. Similarly, data relating to the cost of wholesale handling of food in New York City is at hand. The bureau is now tabulating and studying this data with a view to deciding whether it would be desirable to establish a store or series of stores on a social basis with a view to doing everything possible for the consumer consistent with maintaining a self supporting business.

It is hoped also that this bureau may in time become a bureau of information and public education in problems relating to food supply.

In addition to the three bureaus mentioned, a scientific research commission has been organized and appointed by the governor of the state of New York but supported by the Department of Social Welfare, which is to devote some \$50,000 to the research and experimental work in ventilation of public schools and other buildings. The decision to undertake this research work grows out of the conviction that there is nothing which more vitally affects the health of school children than the problem of providing an adequate supply of fresh air under the best conditions. Apparently, however, even the most fundamental facts which lie at the basis of any effort to ventilate our school buildings have not been determined scientifically from experiments made thus far. It is hoped that the study which will be made by this commission will make it possible to establish with some degree of accuracy those fundamental facts which should be maintained in schoolrooms if they are to be the most beneficial to the health of the children. When these facts have been determined the engineering problem of meeting these conditions will be relatively simple.

In conclusion, I wish to reiterate that it is my judgment that the tendency which seems to be prevailing on the part of public spirited citizens with means to support and encourage public health activities is a tendency in the right direction and should be widely emulated. It is my belief that the funds devoted to these purposes accomplish relatively more than those devoted to other purposes, because public health itself is so fundamental to the progress of education and the general improvement of social conditions.

"Public Health is Purchasable." What better function can be performed by the funds devoted to benevolent purposes than supplying the purchase price of health?

THE NON-IDENTITY OF MODERN LEP- ROSY AND BIBLICAL LEPROSY.

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Read before the Section of Public Health Officials, American Public Health Association, Colorado Springs, September, 1913.

The only excuse for presenting this very old subject now is the continuance, even in these days, of the mis-treatment of sufferers from modern leprosy (lepra), due, as I believe, largely to unreasoning, traditional fears, to the terrible word-pictures which the clergy draw of Biblical leprosy (tsaraath), and to the popular identification of lepra and tsaraath, so widespread in all Christian lands. If it can be conclusively shown that lepra and tsaraath are names for two very different diseases, it may be possible to overcome the panic-stricken and cowardly cruelty so often visited on the modern lepra cases.

The problem of comparing the two diseases is not so difficult as might at first appear. It is true that we must compare a written account, penned thousands of years ago, with an actual disease now existing in numerous patients. But the written account in question (Leviticus xiii) has been translated with the greatest care from the most studied of all ancient literature. It does not consist of mere literary or poetic references on the one hand, nor of crabbed technicalities of long-dead, old-time physicians on the other. It was written by or under the supervision of the most highly gifted and best educated men of that day; but it was written in simple everyday language, avowedly intended as a diagnostic guide for the priests. It is not and does not pretend to be a complete description prepared for medical students or physicians, intended to make them familiar with every stage and symptom; it confines itself simply to supplying the data the priests needed in deciding a crucial question—a momentous, solemn question to the individual whom they examined. A mistake in diagnosis might cut him off from his family, friends and the community, condemning him to outer darkness and loneliness, misery of every kind. Hence the minuteness and care, the repetitions and emphasis of the description; hence also the confinement of the description to the simplest of terms.

Taking these diagnostic signs, studying and checking them up, we find two almost constantly reiterated. Whatever the minor variations noted for varying types one of the requirements were usually essential for the recognition of tsaraath; absence of both excluded it absolutely. If the lesion in question was under the skin, or if it enlarged noticeably in a week or at most two weeks, the patient had tsaraath.

If the lesion was not under the skin, or being in it, failed to enlarge much in a week, or at most two weeks, the patient did not have tsaraath (although, if it spread later, it might be tsaraath).

Is there need to go further? However much or however little we may know about lepra, we all know that its skin lesions are in, not under the skin; we all know that these skin lesions enlarge very slowly; we all know that to demand for a diagnosis of lepra, that the lesions should be subcutaneous, or should spread rapidly would be to prevent the recognition of practically every case at every stage; and would compel the diagnosis of lepra in cases entirely free from it. In brief, if a physician, following the Mosaic handbook, should attempt to pick out modern lepers from a crowd of miscellaneous patients, he would infallibly miss every leper and might easily identify as leprosy some of the innocent cases. Tsaraath and lepra are not only different—on the crucial diagnostic points, tsaraath is the converse of lepra.

How then has arisen the widespread belief in their identity? First, perhaps by reading into the text the ideas of contemporary historians and commentators all down the ages—ideas based, not on the text, but on what these commentators and historians thought about what was in it, but particularly about what was not in it; about what they thought ought to be in it, which Moses unfortunately left out! Second, from pure confusion of mind with regard to the identity of very many diseases. Remember that when the Hebrew text was first translated, indeed for very long after that period, not only lepra itself was only partially known, but syphilis was yet to be worked out; tuberculosis as an entity was not even suspected; cancer itself was in chaos. Typhus fever and typhoid have only been disentangled within 100 years; chicken-pox and smallpox were taught even by Unna as identical. The translators found in the Hebrew text a terrible disease described; they had heard lepra (or leprosy) spoken of with horror and loathing; perhaps they had seen it, shuddered and hastened away. They had no great reverence for the literal identification of one loathsome disease with another. They wanted to bring out the spiritual lesson, not the material. To translate the name "tsaraath" as "plague" or to transfer its name directly into the English text would take from it all significance to the average mind. Why not translate it as leprosy, a disease people already knew and feared; a quite probable disease too, for was it not exactly in Palestine that leprosy flourished?

Modern medical writers, usually slip out of the question by assuming that Moses adopted the folk-lore or old-wives' fables that he found existing, and lumped under tsaraath, either from carelessness or ignorance, a wide range of commonplace skin diseases, some of which they identify as psoriasis, vitiligo, syphilis, scabies, etc.

This assumption does Moses little justice and is not at all in keeping with the care and the foresight he showed in his writings in general; moreover, the identifications of the psoriasis, etc., are made by these writers on single symptoms wrenched from their context; a long distance, snap diagnosis that would put to shame a correspondence school doctor.

I do not pretend to identify tsaraath with any disease; the diagnostic points given are not sufficient to recognize what it was; but they are wholly sufficient to recognize what it was not—and this list includes psoriasis, vitiligo, syphilis, scabies, for none commonly show subcutaneous skin lesions, nor do the skin lesions necessarily enlarge definitely within one week or two.

There is, however, no objection in speculating on its identity with any modern disease. There are two points in which tsaraath, as described by Moses, differs essentially from any disease known now; these are its ability to develop in clothing; and its ability to develop in the walls of houses. If these are dismissed as mere errors of observation, then we may as well dismiss the whole subject; for errors so great once admitted would assign the whole thing to the waste basket. If we suppose that Moses knew what he was writing about, we must give due regard to these statements; and we have no right to assume that tsaraath could not have presented these features simply because no modern disease is known to do so. Suppose that a parasitic mould or sporothrix, sometimes saprophytic, existed, which has since died out; at once the whole account becomes lucid and connected.

However this may be, there are two other points upon which tsaraath and lepra are often supposed to agree. The first is that both were extremely contagious; the second, that both were incurable. At this point the psychic and logical muddle becomes so complicated that it is difficult to untangle the threads. In the first place, if tsaraath were extremely infectious, as assumed, it differed extremely from lepra, which, as we know it, is less than one tenth as infectious as consumption. But the intense infectiousness of tsaraath is pure assumption. It is true that on its discovery in a person, that person was pronounced unclean, and, like all the unclean, was cut off from communication with the public. This has been assumed a public health measure—the isolation of a contagious disease. But nowhere is any instance quoted in the Bible of even a single case, caught from a preceding case. Never from cover to cover is the tsaraath case spoken of as a physical menace to others. No precautions were prescribed for the priests in handling or examining tsaraath patients, tsaraath clothing, or tsaraath houses; nor were any precautions prescribed for the workmen who were to scrape the disease from the stones or pull the infected house down. Then why was the tsaraath-infected patient's clothing or house called "unclean"? I do not know. Why was a daughter in whose face her father spat called unclean; was it because she was a grave public health danger to others? Why was a recent mother "unclean" and still more why was she unclean twice as long if the baby were a girl as she was if the baby were a boy? Was it for fear of infection to others? If "uncleanness" was intended as a public health measure, why were not syphilis, measles, tuberculosis, cancer and smallpox made unclean also, for undoubtedly all

these diseases flourished then as now. In all but this one of the many, many circumstances under which a person was pronounced "unclean" by the Mosaic law, we frankly are in ignorance of its significance. Why should we assume that its significance in the case of tsaraath was so different, so evident, so modern as isolation for a communicable disease?

With regard to the alleged incurability of tsaraath helping to identify it with lepra, we may dispute the incurability of lepra with some success. But it is still simpler to show that tsaraath was not incurable, else why was an elaborate ceremonial provided for the cured man or woman to perform? Leaving out of account the alleged miraculous cures, we have several implications that cases became cured spontaneously; indeed, the diagnostic handbook in Leviticus points out how to recognize a cured case.

SUMMARY.

Lepra, the modern leprosy, shows its skin lesions in, not *under* the skin, enlarging slowly if at all, the enlargement in most cases being far too slow to notice in a week, or even in two. Tsaraath, the Biblical leprosy, showed its lesions, *under*, not in the skin; if the lesions were in the skin but failed to enlarge noticeably within a week, or at most in two weeks, the suspect was released. The two diseases are, therefore, *converse*, as regards these, the essential points of diagnosis of tsaraath. The infectiousness and incurability of tsaraath, supposed to aid its identification with lepra, are nowhere mentioned or implied in the Hebrew accounts. This ancient belief in the identity of the two diseases has undoubtedly added much to the sufferings of the modern leper and should be dispelled as soon and emphatically as possible. Modern leprosy should never be called by that name, but always designated as lepra; and every effort should be made to point out that it is produced by a well-known germ, belonging to the tuberculosis group; and is in clinical effect a second cousin, so to speak, to tuberculosis, but much less infectious—a disease to be supervised and prevented from spreading, of course, but calling for no panic-stricken flights from its neighborhood and no especial hardships or cruelty to its unfortunate victims.

I wish to acknowledge the kindly help, criticisms and suggestions in preparing this paper of two Hebrew scholars, Rev. Dr. Waller, principal of Huron College, Western University, London, Ontario, and Rabbi Deinhardt Lecturer on Hebrew, University of Minnesota, Minneapolis, Minn. On the clinical side, my own limited acquaintance with the disease in Massachusetts and Minnesota has been kindly supplemented by the greater experience of Dr. H. M. Bracken, secretary of the Minnesota State Board of Health, who has long interested himself in the lepers of the United States; and of Dr. A. J. Chesley, director of the Division of Epidemiology of the same Board, who has seen the disease in the Philippines as well as in Minnesota.

BOOK REVIEWS.

Immunity Methods of Diagnosis and Therapy and Their Practical Application, *By Dr. Julius Citron, Assistant at the University Clinic of Berlin. Translated from the German and edited by A. L. Garbet, M. D., Assistant Pathologist and Adjunct Visiting Physician, German Hospital, New York. Second edition, revised and enlarged, 4^o 267 pages. Cloth, \$3.50 net. Philadelphia, P. Blakiston's Son & Co. 1914.*

This book constitutes one of the best simple presentations of the subject of immunity methods of diagnosis and therapy with which we are familiar, and admirably supplements the various handbooks dealing with the theories and principles of immunity.

In its second edition, it includes chapters dealing with the immunity work on malignant tumors, anaphylaxis, serum therapy, and chemotherapy. The new material is well chosen and the information given is accurate, though an occasional slight error is noted, as,

for example, the statement (p. 239) that the serum therapy of infectious diseases is still "in its prime." No mention is made of Abderhalden's recent work in the sero-diagnosis of pregnancy, nor of Swift's work on salvarsanized serum, nor of Schick's valuable skin reaction with diphtheria toxin. Despite these omissions, the book will be found extremely useful. It can be cordially commended to all interested in modern diagnostic and therapeutic immunity methods.

Charles Bolduan.

The Effect of Tuberculosis Institutions on the Value and Desirability of Surrounding Property. *A sixty-four page pamphlet issued by The National Association for the Study and Prevention of Tuberculosis. The pamphlet will be distributed free of charge to members of the National Association. Non-members of the Association may purchase it, for ten cents, postpaid, from the office of the National Association for the Study and Prevention of Tuberculosis, 105 East 22nd Street, New York City.*

In an effort to allay the constant clamor which seems to arise every time it is attempted to locate a tuberculosis hospital, either in the city or in the country, this pamphlet was issued, which is designed to present practically all of the available information upon this important subject in such form that those who are interested in the location of institutions may find ready access to it. The subject is divided into eight parts as follows:

1. A review of former investigations of this character including those by William H. Baldwin, and Philip P. Jacobs.

2. Information obtained from a questionnaire study of eighty-four hospitals and sanatoria in all sections of the United States with regard to the change in surrounding property values; the effect of these institutions on the health of the neighbors; the original reasons for opposition and the present feeling; some

material benefits of an institution to the neighborhood; and many pertinent comments by superintendents on all phases of the question.

3. Facts obtained in a first-hand investigation of five institutions in different localities and of different types to show the rise or fall of assessed valuation of surrounding property; the increase of property values indicated by known sales; the expressed feeling of property owners; and the feeling of the general public.

4. A digest of several typical laws regulating the approval of sites, and some restrictive ordinances.

5. Some opinions of eminent men, boards of health, and insurance companies.

6. Court decisions relating to the location of hospitals, sanatoria and dispensaries, including the possibility of their being a menace to public health, or a nuisance.

7. Summary and Conclusions.

8. Appendix, with assessment tables referring to hospitals in Chapter 11.

Among the conclusions which are drawn from a study of the data collected in this report, none are more emphatic than these two, that a tuberculosis hospital is not a menace to the health, nor a detriment to property. Practically all of the evidence that has been collected, whether in the form

of opinions of interested parties, or of court decisions, or of entirely disinterested individuals, bears out these conclusions. On the other hand, there is considerable testimony available to convince one that hospitals are frequently a benefit to communities in which they are located. So convincing are these conclusions that anyone who is open to conviction cannot fail to recognize their worth.

Pathogenic Microorganisms. *A textbook of microbiology for physicians and students of medicine. By Ward J. MacNeal, Ph. D., M. D., Professor of Pathology and Bacteriology in the New York Post-Graduate Medical School and Hospital, New York. (Based upon Williams' Bacteriology.) 12 mo. Pp. xxi 462. With 213 illustrations. Philadelphia. P. Blakiston's Son & Co. Price, \$2.25.*

Since the appearance of the first edition of Williams' Manual of Bacteriology, in 1898, it has been a favorite in many quarters on account of the arrangement of the subject, the judicious apportionment of space to the various heads, and especially on account of the care and attention given to establishing a firm basis of general bacteriology before going to the study of the purely medical side. The fourth and fifth editions were hastily prepared and contained numerous errors but in Doctor MacNeal's edition it has been greatly improved, and will be welcomed by those who desire a text which includes a discussion of laboratory technique and general bacteriology as well as of the purely pathogenic sides. Particular effort has been made in the present edition to improve the sections dealing with the pathogenic microorganisms other than bacteria.

Among the sections deserving especial mention as better than the ordinary are those on the microscope and microscopic technique, and on laboratory technique in general, a discussion covering 122 pages. Part Two deals with the general biology of microorganisms and contains excellent chapters on the distribution and relation to their environment. Part Three discusses specific microorganisms, including yeasts, molds, fungi, bacteria, and protozoa.

While the book is not planned to compete with other works in a detailed discussion of each subject, it contains remarkably well chosen material in a brief and usable form and the illustrations are equally well chosen from a large number of standard references. In the form of footnotes, there are many references to original sources and there is an index of proper names as well as of subjects.

E. A. Ingham.

HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS

Jacksonville, Florida.

Dr. C. E. Terry, Health Officer of Jacksonville, presents an excellent report for the year 1913. Jacksonville is a city of 67,209 people, as estimated by the new method prescribed by the Bureau of the Census, and presents all the typical problems of a southern city with its colored population of more than fifty per cent. and its characteristic diseases. Apparently Dr. Terry's administration may well serve as a model to similar cities, as his efforts have met with notable success.

The new method of estimating population (by the ten-year federal census alone instead of by the 1905 state census and 1910 federal census) has caused a lower figure to be set for the total population and thus serves to lessen the apparent decrease in death and disease rates which would otherwise be quite marked. The crude death-rate was 19.1, a reduction of .7 per thousand from the 1912 figure. Corrected for non-residents, the rate is 15.7. The crude negro death-rate was 22.5, and the crude white rate 15.6, so that it may be seen that the high figure is largely due to the negro population. The birth-rate for the year was 24.2 per thousand and the infant mortality rate was 110 per thousand births, a good figure in view of the number of births attended by midwives.

The contagious disease situation has shown, in general, continuous improvement during recent years. Tuberculosis has been difficult to reduce, owing to the numerous cases which are brought in, especially those which come from the northern states for the winter; and to the susceptibility of the negro to diseases of the respiratory tract. Owing to lack of funds, little work has been done in preventing tuberculosis and it heads the list

of causes of death. Typhoid fever has shown a steady and marked decrease in its death-rate, accompanying the elimination of open privies and the consequent decrease in infection by flies. Diphtheria shows a marked increase in the number of cases accompanying a similar increase throughout the state. Realizing the importance of carriers in relation to the spread of diphtheria, the Board of Health has adopted a new ruling which provides for the location and control of carriers and that no fumigation shall be done unless the prescribed procedure for their control has been carried out. During the past, no cultures of nasal specimens have been made, owing to inadequate facilities, but for the future an outfit with two swabs has been prepared and nose and throat cultures will be planted on the same serum tube, thus avoiding the extra work in negative cases. The malaria death-rate has been largely decreased by investigating all deaths reported, as it is found that the term malaria, is frequently misused. Extensive extermination of mosquitoes by means of oil is also carried on, but it is urged that citizens realize their own responsibility instead of relying wholly on the health authorities.

The infant mortality situation has been in very bad shape, up to the present time, owing to the unsanitary conditions among the negroes and the ignorance and ridiculous practices of the midwives. Of 1,632 births in 1913, 849 were attended by midwives, so that it was not thought possible to prevent their practising entirely since it would probably deprive many mothers of skilled attendance of any kind. To avoid this difficulty, an ordinance was passed which forbade the practice of midwifery by any one who had not

passed a satisfactory examination in the elements of the subject and that in preparation for this examination the Board of Health should provide free instruction in such elementary principles.

Another section of the report deals with the construction of the new isolation hospitals, and is fully illustrated. These new hospitals are built after the plan used in the Providence City Hospital as devised by Doctor Chapin, but are on a smaller scale and would be well worth visiting.

Other reports are those of the infant welfare nurse, the school medical inspectors, the school nurses, the colored district nurse, the

bacteriologist and chemist, the milk and dairy inspector and the market inspector; all of which are well-prepared and instructive. The tabular reports are well chosen, and so arranged as to make any desired piece of information easy to find. Both the statistical tables and the report in general conforms, as far as possible, to the plan devised for uniform reports by the committee of the Massachusetts Association of Boards of Health.

Judging from the report, those who attend the meeting of the American Public Health Association will find that they may spend some of their time very profitably in a study of Doctor Terry's work and methods.

Orange, New Jersey.

The city of Orange, New Jersey, presents its report for the year ending December 31, 1914. During the year the health officer, Mr. J. Scott MacNutt, resigned, his place being filled by Mr. Frank J. Osborne, formerly of Montclair, New Jersey. The good work which the Board of Health has been doing in the past has been carried on with increasing success.

The death-rate of infants under two years of age from intestinal diseases reduced nearly fifty per cent. during the year, due largely to the employment of a nurse during July, August, and September, and to the successful cooperation with several charitable bodies which have organized into "The Infant Hygiene League of the Oranges."

A short summary of the mortality statistics shows interesting improvements. The corrected local death-rate shows a drop from 13.96 per 1000 population in 1912, to 11.86 per 1000 in 1913, the lowest on record. Also the infant mortality rate is the lowest on record. For the first time since records have been kept, there was no death from scarlet fever or influenza and the number of cases of scarlet fever, diphtheria, typhoid fever and measles have shown material decreases. The number of cases of tuberculosis show some increase, due probably to the doctors realizing the value of early diagnosis

and report in order that proper prophylactic measures may be taken. However, the death-rate, of 188 per 100,000 population, is the lowest, with one exception, for the last fifteen years.

The work on the control of the milk supply is of unusual value, the past year showing great advances. Two new ordinances were enacted which are in the main responsible. One of these fixes the bacterial limit of milk sold in the city at 100,000 per cubic centimeter. In the report there is a table which shows the results of the complete analysis of milk for specific gravity, fats, total solids, bacteria and sediment, for each dealer, from June to December. The dairy scores are also given in another table. This publicity is very valuable, since it gives the public a chance to see just what they are buying and gives the producers the chance to see where they can improve.

The second ordinance which went into effect in September requires steam sterilizers to be provided in every milk bottling establishment, besides several other excellent regulations governing the conduct of such places.

In fact, the work of caring for the public health seems to be carried on in a most efficient and progressive manner as shown by the excellent report.

Lowell, Mass.

The City of Lowell, Massachusetts, presents the annual report of the Board of Health for the year ending December 31, 1913. In the introductory report of the board to the mayor and council, there are one or two interesting facts. Lowell has apparently always had more or less typhoid fever with now and then an epidemic which shows higher numbers of cases and deaths. In 1913, the total number of cases was 65, with eleven deaths. These figures show a decrease from 1.59 per 1,000 inhabitants to .10 in twenty four years. The city also had a small epidemic of a very mild form of small-pox during June, July, and August. There were forty cases, but no deaths.

Following this introductory report come the reports on medical inspection of schools, inspection of milk and minor divisions of the department. None of these reports are very full, giving little more than the bare statistics. Quite an amount of work is done apparently

on dairy inspection, this being placed as more important than the bacterial counts which, however, are done, although no record is given.

Under the section on vital statistics are given several comparative tables showing deaths and, in some instances, cases for a few years back. There is also a mortality report of deaths for 1913, classified according to the international classification, and by age periods.

The financial statistics which occupy several pages of the last section of the report are unusually full and well tabulated, in most cases showing comparisons for several years. The figures on garbage and refuse disposal which are given here are not often found in health department reports.

If any criticism of the report as a whole were to be made, it would be more on the form rather than on the information contained therein.

DEPARTMENT NOTES.

Health Department Accounting.

In the weekly *Bulletin of the Department of Health of New York City*, for May 23, 1914, there is a short article on accounting and analysis of costs which seems to be of sufficient value to quote entire.

"Cost analysis," it says, "is essential to the intelligent and successful conduct of any business. The business man who fails to analyze costs, is likely to be the victim of competition. In the conduct of public business, the element of competition does not enter, public business being essentially a monopoly; but the administrator of a municipal department, who seeks to serve his city well, will endeavor to ascertain how the money entrusted to him should be distributed, how it is actually distributed and with what results.

"Commentators on Health Department work in various cities throughout the country frequently compare the expenditures for health purposes of one city with those of another, on the basis of population. Thus

it is assumed that a city which spends eighty cents per capita per annum for health purposes, is a progressive city in the matter of health, while one which spends thirty or forty cents is unprogressive. Superficial comparisons of this sort are of some value, but the time has come when the cost of public health work should be studied analytically with relation to the various functions of the Department of Health.

"A standard method of accounting for Health Departments is needed; such a method, if used, would enable the Department of Health in this city, for example, to compare the cost of its work, item for item, with the cost of similar work carried on elsewhere. In this way, normal expenditures for definite purposes would soon be established. Economies of method devised by particularly capable and successful administrators would become known to others, and could be generally adopted, while extravagance and waste would speedily and almost automatically be checked.

"The Department of Health of the City of New York has just completed an expense accounting statement for the year, 1913, which, while it does not exhibit, as fully as desirable, the individual costs of all of the functions of the Department, nevertheless is a distinct step in the right direction.

"At the next meeting of the American Public Health Association, the appointment of a committee will be requested to outline a standard system of cost accounting for Municipal Health Departments."

Summer School for Physicians and Health Officers.

Under the auspices of the Kansas State Board of Health and the School of Medicine of the University of Kansas, is to be held the fourth annual Summer School for Physicians and Health Officers. This is a rather unique undertaking and the men attending obtain much valuable information and knowledge.

The following are the titles of some of the lectures which relate more particularly to public health work: Those by E. F. McCampbell, M. D., Executive officer of the Ohio State Board of Health, are: Public Health Problems and Their Solution; The Control of Contagious Diseases by the Local Board of Health Agency; Tuberculosis, the Health Officers Attitude toward the Problem; Occupational Diseases and Hygiene. Some of those by M. J. White, M. D., Surgeon, Public Health Service, St. Louis, Mo., are: The Problem of Infant Mortality; Overcoming Opposition to Public Health Work; The Epidemiology of Poliomyelitis. Dr. E. R. Kelley, State Commissioner of Health, Seattle, Wash., also gives several lectures, among which are: The Evolution of our Ideas on Infection; Camp Sanitation; School Sanitation; and Milk and the Public Health.

Health Department and Physician.

What a physician ought to do and what a department of health may do in return is suggested by the following note from the New York City *Weekly Bulletin* of June 13:

I.

The department expects correct and prompt reporting of births.

Correct and prompt reports of deaths.

Prompt reports of cases of infectious diseases.

Systematic coöperation in seconding the efforts of the department of health in public health work.

II.

The department places at the disposal of physicians diagnostic laboratory facilities in tuberculosis, typhoid fever, diphtheria, meningitis, malaria, syphilis, gonococcus infections and rabies.

It furnishes assistance in the clinical diagnosis of contagious diseases, meningitis, poliomyelitis, rabies and diseases of doubtful origin considered possibly communicable.

It supplies physicians with antitoxins and vaccines for the prevention and specific treatment of diphtheria, tetanus, typhoid fever, rabies, gonococcus and other infections in which such treatment is of value.

It stands ready, day and night, to perform intubations for cases of laryngeal diphtheria.

It performs free disinfection of infected premises for the physicians' patients.

It offers hospital care for the patients ill with contagious diseases, including tuberculosis.

It provides a sanatorium where physicians may send tuberculous patients.

Through its system of school medical inspection it refers physicians to a large number of patients needing medical and surgical care.

It guards against the practice of unqualified midwives through a system of permits, and against unqualified physicians and so-called healers by close supervision of all birth and death certificates.

It campaigns against quackery and patent medicines.

It publishes numerous scientific bulletins for free distribution to physicians.

Hypochlorite Treatment Now Firmly Established.

Tabulated Typhoid-Fever Death-Rate Statistics for Eight American Cities Before and After Using the Chemical.

"That 600 cities in the United States are using hypochlorite of lime for water sterilization and that no city following a proper procedure has found it necessary to discontinue its use was the contention of C. A. Jennings in a paper read before the Illinois

AVERAGE TYPHOID-FEVER DEATH RATES PER 100,000 PERSONS.			
City.	Before using. Period. Rate.	After using. Period. Rate.	
Baltimore.....	1900-10 35.2	1912-13 22.8	
Cleveland.....	1900-10 35.5	1912-13 10.0	
Des Moines.....	1905-10 22.7	1911-13 13.4	
Erie.....	1900-10 38.7	1912-13 13.5	
Evanston.....	1907-10 26.0	1912-13 14.5	
Jersey City.....	1900-07 18.7	1909-13 9.3	
Kansas City.....	1900-10 42.5	1911-13 20.0	
Omaha.....	1900-09 22.5	1911-13 11.8	

Water Supply Association on March 9. Where the bleach treatment has fallen into bad repute it has been due, in his opinion, to a poorly designed plant, improper application, anticipation of a removal beyond practical limits or to the fact that the method was not adapted to remedying the particular water trouble encountered. Beyond its sphere of usefulness, bleach treatment has practically no value.

"Statistics were presented to show that hypochlorite treatment is now firmly established, as it has accomplished what its conservative advocates originally claimed for it. The selective action on germs of water-borne disease has been proved by bacteriological analyses and typhoid statistics over a period of nearly six years.

"Of the eight cities the maximum reduction, 72 per cent., was in Cleveland, and the minimum, 35 per cent., in Baltimore. The average was 51 per cent. The total population considered is 2,033,000 and with a reduction per 100,000 population for each year of 15.8 deaths with lives valued at \$5000, \$1,806,000 annually has been conserved."

Engineering Record, June 13, 1914.

Free Wassermanns by a Town Board of Health.

The town of Brookline, Mass., has again shown the progressive attitude of its board of health by the circular recently issued to all the physicians of the town, calling atten-

tion to the fact that the board of health will make, free of charge, for residents of Brookline, Wassermann tests for syphilis and the complement fixation test for gonorrhœa which corresponds to the former. The board of health believes that the more frequent use of these tests will result in preventing the spread of these serious communicable diseases and will also enable physicians to recognize and successfully treat, in so far as possible, cases afflicted with these diseases. Accompanying the directions for taking proper blood samples, is an explanation of the various uses of the Wassermann reaction and the complement fixation test, and also an interpretation of the results. There are also rules for patients.

Lack of Coöperation between City Departments.

"It is one of the anomalies of the regulation of street cars in Chicago, as far as it relates to the health and comfort of passengers, that the Board of Supervising Engineers approves the purchase of cars by the companies without permitting the health department to have any say in regard to the matter. Then when the cars are put into service and the public storms the health department with complaints on the subject of the dustiness, bad ventilation, lack of heat, etc., the department has to try to persuade or threaten the companies into making the necessary alterations in the cars or their equipment.

"The department, therefore, is glad to chronicle a radical step forward. The Northwestern Elevated Railway Company has voluntarily submitted to the ventilation division of the health department plans for the ventilation of all new cars."

Bulletin of Chicago School and Sanitary Instruction, May 23, 1914.

The New York State Health Department Bulletin.

It is with interest that we note that the March, 1914, issue of the *Monthly Bulletin of the New York State Department of Health* appears under the editorship of Prof. C.-E. A. Winslow, formerly of the Massachusetts Institute of Technology and the College of

City of New York. This bulletin is one of the best of those issued by state health departments. The March issue is called the School Principal's number and is designed to give them current opinion and information on school sanitation. Among some of the larger of the articles is one by Professor Winslow, himself, who is the advisory expert in public health education. The article is entitled, "Sanitation of the School Building." It takes up from the latest point of view such topics as, Good Air and What it Means, Lighting in the Schoolroom, School Seats and Spinal Disease, and Water Supply and Toilet Facilities.

Another very interesting article is one on School Medical Inspection, by S. Josephine Baker, M.D., of the Bureau of Child Hygiene, Department of Health, New York City. This article has very good illustrations showing some of the actual work. Doctor Baker says, in introducing the subject, "the use of the school as a clearing house to determine the physical condition of children of school age and the responsibility of the school for conserving the health of school children, are so important that there ought no longer to be any argument as to whether school medical inspection should be carried out in any community. Fortunately, in New York State, the present law requires that the health of the children in all of the public schools, of this state shall be cared for in this manner."

Besides these main articles are also other shorter ones which contain often useful information for health officers. There are also the usual reports and statistical tables. Indeed, the New York State Department of Health and the new editor of the *Health News*, Professor Winslow, are to be congratulated on the value and make up of the bulletin.

Erie, Pa., Board of Health Regulation Regarding Wrapping of Bread.

During the past winter, the board of health of Erie made a regulation requiring the wrapping of bread in clean paper impervious to pollution from dust, flies, vermin, or from the hands of persons handling it before

sale. The bakers objected to the rule on account of the alleged deterioration of the bread due to wrapping.

After litigation on the subject, an opinion was handed down from the Court of Common Pleas of Erie County upholding the board of health. The following are some of the findings which upheld the decision:

"Bake shop products are used as an article of food without further preparation by washing or cleaning, and since drivers of wagons are careless about personal cleanliness, and since often little or no care is taken to protect the bread from dust, etc., en route, it easily becomes contaminated and may become a direct cause of spreading disease. Also, since all bake shop products are consumed, when fresh, within four to fourteen hours after baking, the wrapping at the plant can have no harmful effect. In fact, from evidence brought out, the wrapping of bread actually tends to improve the quality. The cost of such wrapping was not found to be excessive nor a burden to the bakers."

This question seems to be a real public health problem and one which has come up in other cities. It may be that this decision may prove useful as a reference.

Violet-Ray Sterilization for Niagara Falls Filters.

"Niagara Falls will have the first municipal ultra-violet-ray sterilization plant in this country. Contract negotiations were consummated June 5 for a 35-lamp installation with the R. U. V. Company, Inc., of New York, to be completed about September 15. 'Pistol' lamps, as described in the *Engineering Record* of August 2, 1913, page 121, will be used, seven in each of five concrete canals, although the company estimates twenty-five lamps only will be required to handle the capacity of the plant, 16,000,000 gallons daily.

"The cost of the canals and lamp installations will be \$19,800, while the city will erect a building and transformers to change the current from alternating to direct, at a cost of \$2200. Approximate costs per 1,000,000 gallons for maintenance are guaranteed as follows: Current, 7 cents; lamp

renewals, based on a 2900-hour life, 60 cents.

"About 1 gr. per gallon of coagulant and 5 lb. of bleach per 1,000,000 gallons have been used at this plant, the total cost of chemicals running about \$1.50 per 1,000,000 gallons. It is hoped that the coagulant can be cut in half and still give a clear water, in which case the ultra-violet-ray installation will prove economically advantageous.

"The channels in which the water will be sterilized will be of concrete, 2 feet wide, 3 feet deep and 26 feet long, affording a contact period of 30 seconds with the ultra-violet rays. The lamps are spaced 30 inches apart and in front of each is a baffle of wired glass in which a rectangular opening is cut to divert the water against the quartz tube."

Engineering Record, June 20.

Police Coöperate in Panama Health Work.

"A number of suggestions made by the health officer of Panama looking toward an improvement in the sanitary conditions at the public market on North avenue have been approved by the Governor and agreed to upon the part of the Panama Government. Under the new arrangement, which will be placed in effect at once, it is proposed to hold the renters of tables in the market responsible for the condition in, under, and around them, and they will also be required to keep the floor pertaining to these tables free of refuse at all times. To see that this order is properly carried out, the Panama police department will detail three members of its force for duty at the market during the regular hours of business, namely, from about 6 a. m., to 2 p. m. One of the policemen must be able to speak Spanish, another English, and the third French, fluently. In addition, the health officer will employ two men whose duty it will be to keep the public aisles between the tables and stalls clean. The department of public works of the Panama Government has agreed to bear the cost of the two men thus employed, and an arrangement has been practically arrived at, whereby the amount involved will be collected from the official in charge of the market at the close of each

day's business, and turned over to the collector of the Panama Canal in reimbursement for the outlay."

The Canal Record, June 3.

The Application of the Tuberculin Test to a City's Milk Supply.

In the May number of the *Charlotte Medical Journal* there is an interesting article on the application of the tuberculin test to a City's Milk Supply, by Mosly G. Perrow, Ph. D., of Lynchburg, Va. The city of Lynchburg was taken as an illustration, as the process had been so well worked out there. The ordinance as passed by the city council required "the testing with tuberculin of every cow supplying milk or cream to the city or the pasteurizing of such milk or cream, but it was also stated that no reacting cow could supply milk or cream to the city regardless of pasteurization, and further that every cow inside the corporate limits should be tested whether the owner sold the milk or not. The reacting animals should immediately be slaughtered under direction of the health officer or placed in quarantine by the state authorities."

It took three years of educational work before this ordinance could be passed, but now the article says that the herd owners are even more eager to have it done than the public. The fee charged by the health department is remarkably low, 25 cents per head, so that it is no burden, and the Bureau of Animal Industry gives the city the tuberculin.

In most instances, also, the cows are slaughtered and sold at a fair price, since in most cases the tuberculous lesions are localized either in the lungs or the intestines and the rest of the body is perfectly good for food.

This experiment in Lynchburg appears to have been very successful and apparently could be applied to other cities of not too great size where the milk supply is localized more or less. But as Dr. Perrow remarks, "The lesson taught is that while testing with tuberculin is of the greatest importance, it should not be undertaken without a previous course in general education. No one can oppose testing if he fully understands the needs."

A New Bureau of Public Health Education.

It is interesting to note in the June 6, 1914, issue of the *Weekly Bulletin of the Department of Health of New York City*, the institution of a new department which shows the progressive spirit of the New York Health work.

"On May 26, 1914, the board of aldermen by a vote of 54 to 4, recorded its approval of a proposal made by the commissioner of health, and subsequently endorsed by the board of health and the board of estimate and apportionment, to establish in the department of health a bureau of public health education.

"The civil service position of Director of the Bureau of Public Health Education has been established at a salary of five thousand (\$5,000) dollars per annum, and it is understood that the appointee will devote his time and attention to the work of the bureau to the exclusion of all conflicting professional interests. Pending the appointment of a permanent director of the new bureau, Dr. Charles F. Bolduan, formerly assistant to the general medical officer of the department, has been directed to organize a division of public health education, with such means as are available; Dr. Bolduan has been designated temporarily chief of division and has been made directly responsible to the commissioner.

"Among the suggested functions of the proposed Bureau of Public Health Education are the following:

"1. To prepare and publish popular leaflets dealing with various matters of public health; to issue press bulletins; and to edit the regular publications of the Department of Health, including the *Weekly Bulletin*, the *Monthly Bulletin*, and *Staff News*, and such other publications as may hereafter be issued.

"2. To organize and direct public health lectures, both independently and in connection with the existing educational, social, medical and civic agencies.

"3. To prepare traveling exhibits to be shown in various parts of the city, designed to educate the public in various phases of public health.

"4. To prepare and exhibit moving picture films dealing with public health work.

"5. To administer the library of the department of health and conduct in connection therewith a Journal Club for the study by department officials of public health literature.

"6. To assist in the organization of a school of sanitary science or in the preparation of practical courses in public health in conjunction with medical schools and colleges.

"7. To organize educational lecture and study courses within the Department for the training of various groups of workers."

Another Baby Bulletin.

The North Carolina State Board of Health has just issued its *Special Bulletin No. 40* as a supplement to the *May Health Bulletin*. It is entitled "How to Keep Your Baby Well," and is an excellent example of how a bulletin intended for popular education should be prepared. It is printed in red and black and has its headings emphasized by heavy type in such a way that it is attractive and easily readable. Paragraphs and sentences are short and to the point but in many cases this four-page leaflet will undoubtedly be found to give more results than the more comprehensive government bulletin on the care of the baby.

As an example, we clip the following from the heading "What a Baby Needs."

Food—Mother's milk is the best food known for babies. A baby should gain steadily in weight. When he fails to do this, or if he gets sick, don't lay it to teething. It is probably indigestion due to improper feeding.

Air—fresh, pure, outdoor air, day and night. Protect the baby from cold draughts, direct sunlight, and dust; but never keep a baby confined in a closed room, particularly a crowded room or a closed bedroom.

Water that has been boiled five minutes and served tepid, never ice-cold. Spoons, cups, and nipples for baby should also be boiled just before using.

Sleep—undisturbed by people, noise, or strong light. Give baby a bed of his own. Never rock the baby to sleep.

Regular habits of nursing, sleeping, bowel movement, bathing, and exercise. Persist in this from the beginning, and regular habits will soon be formed.

Bathing in lukewarm water daily. A quick bath before going to bed often prevents a restless night.

Clothing that is light and cool in summer and light and warm in winter. If there is heat rash, replace the linen bellyband with a woolen one, clothe more lightly, and bathe in water having a tablespoonful of ordinary baking soda to each gallon of water. Should the woolen band irritate, line with a piece of old soft linen, or dust with powder.

Pure Milk Ordinance Passed in St. Louis.

St. Louis has just scored a big victory for clean milk. The Municipal Assembly has almost unanimously passed the bill drafted by the board of health and supported by a score of civic and social service organizations of the city and by the *St. Louis Republic*, which has been waging an active health campaign.

"The bill provides for the same rigid standards for milk as are recommended by the federal Department of Agriculture. All milk dealers hereafter must register with the board of health, which has full power to grant and revoke permits.

"The chief provision, however, is that one year after the date of passage, all milk sold in St. Louis must either be pasteurized by the Held method or come from cows inspected by the board of health.

"The bill was endorsed by the large milk companies, which receive their supply from outside of the city, and which pasteurize practically all their milk. It was bitterly opposed by the city milk dealers. There are

1,750 cows kept within the city limits of St. Louis. No new dairies have been allowed for a number of years. The dairies now within city limits are survivors of the days when much of the city area was in farm land."

Survey, May 16, 1914.

Disinfection of Dirty Clothing.

"Much of the clothing which is received at the Birmingham municipal disinfection station comes from the poorest class of houses, and is dirty when received, with a result that the process of steam disinfection fixes many of the stains in the clothing, and makes it impossible for the owners to wash them out. Such substances as milk, urine, tea, or similar organic fluids, if spilled upon a clean sheet, and then disinfected in a steam disinfecting apparatus, will cause a more or less permanent stain to be produced. A good deal of time was spent during last year in experiments with a method of dealing with such articles without fixing the stains, and Drs. Higgins and Dale proved that by putting the articles into a warm chamber in which a vacuum is produced it is possible to kill with moist formalin vapor all ordinary infections quite effectively. An apparatus for this purpose has been fixed, and is working quite efficiently. Dr. John Robertson, M. O. H., has advised that if a new station were provided it would be desirable that a laundry should be erected, so that clothing might be first of all washed and dried, then disinfected, mangled, and returned in a reasonably clean condition."

The Medical Officer, May 2.

PUBLIC HEALTH NOTES.

Water-borne Malaria.

The *New York Medical Journal*, in its issue of May 16, contains a very interesting article by Dr. Charles S. Braddock of New York, late Chief Medical Inspector of the Royal Siamese Government, which brings up the old question of the causation of tropical malaria. Doctor Braddock has made personal observations in Cuba and Hayti when a lieutenant of the line in the United States Navy, and in Siam, French Indo-China, Siamese Malaga, the Malay States and along the Eastern Burmese frontier while in the Siamese government service, and unofficially in Ceylon and Egypt. From this varied experience he cites numerous cases which indicate that, while the work of the Italian scientists in proving that malaria is carried by anopheles was correct, it was not complete, since they did not prove that the mosquito was the sole cause.

He believes that in many cases, especially in the tropics and in connection with true malaria perniciosa, protection from mosquitoes is of secondary importance and that cutting back the jungle so that the sun gets at the soil, using floors in tents, and drinking sterilized water are essentials to complete protection. He presents a large number of cases to substantiate his opinions and while many of them are traditions of the natives and none are scientifically controlled experiments they are certainly suggestive. In conclusion he says:—

"I believe that the mosquito is not the only carrier of malaria, but that, differing from yellow fever, malaria is carried by water and soil, and that the mosquito when not infected by a person suffering from malaria gets it from the water in which it was born."

Fly Traps.

"The city of Redlands employs a man whose sole duty it is to look after our municipal fly traps which are placed on the sidewalks in the down-town section by our

merchants. This man baits and empties the traps daily.

"These traps are made on the multiple cone plan and in different sizes, although the character of the type is uniform. From September 1 to September 24, or the first three weeks after these were all in place, this official, A. E. Chapman, caught fifty gallons of flies in the traps, which he estimates to be equal to 3,750,000 flies. The local papers state that these traps have kept the business houses almost entirely free from flies. Each day the traps on the streets are baited with material which will attract the flies, first being emptied of those which had been collected during the previous day. The flies thus collected are burned."

Municipal Engineering, June, 1914.

It is interesting to note that *Public Health Reports* records the passing of an ordinance in Redlands, Cal., which requires that every person in charge or control of any store, market, restaurant, or other place where food or foodstuffs are sold, served, or dispensed, and every owner or person in charge of a public stable, shall maintain in his place of business one or more fly traps properly baited. It fixes the minimum size of these fly traps at 500 cubic inches and makes it the duty of the health department to inspect the traps from time to time to see that they are efficiently maintained.

Red Cross Seals.

"In spite of financial depressions and other obstacles, the Red Cross Christmas seal sale in 1913 exceeded that in 1912 by nearly 3,000,000 seals or a total of 43,000,000. Beginning with 13,500,000 seals in 1908, in six seasons the revenue which these little holiday missionaries have brought to the anti-tuberculosis campaign has more than trippled, an aggregate for the entire period of over \$1,800,000.

"What this money has meant to the

many struggling local and State anti-tuberculosis associations who have received it, is best evidenced by the rapid increase in the number of new agencies and the growing efficiency of existing ones. The anti-tuberculosis campaign owes much to the American Red Cross for its broad-minded and sympathetic coöperation in this important movement.

Journal of Outdoor Life, June, 1914.

Twin Cities' Milk Supply.

A report on the milk supply of the cities of Urbana and Champaign, Ill., by Prof. Horatio N. Parker of the University of Illinois, comes to our attention which shows the good work being done by an educational institution in trying to help improve the milk supply.

"The University Dairy provides practical experience for students taking the course in city milk supply; it provides a good quality of raw milk for a few, and it has enabled dairy men to get a good price for their milk because it has created discriminating customers and so a demand for good milk."

The following opinion of the writer of the report, as to the three probable ways of solving the problem of these two cities, may also be applicable to other cities in similar circumstances:

"To the writer, it seems likely that the problem will be solved in one of the following three ways:

"1. By some local man putting enough capital into the business to enable him to operate his farm on a large scale, with modern labor-saving machinery, and a first-class equipment for bottling milk, and sterilizing milk bottles, etc.

"Amongst the difficulties such a one would have to contend with are bad roads and the fluctuating demand for milk, caused by the floating population of faculty and students. Thus, this population on June 1, 1913, numbered 4,014; by July 1 it was reduced to 784, and on the first of August to nothing. On October 1 it was increased to 4,384.

"2. Some large dealer in Chicago, Peoria, Kankakee or elsewhere may capture the trade from the local dealers and farmers by ship-

ping in milk and at the same time inaugurating a delivery system that shall have courteous employees and be reliable. That this has not actually happened is, perhaps, because the entire milk trade of the two cities is not large enough to be particularly tempting to capital.

"3. A serious milk-borne epidemic may convince both business men and the University that an efficiently regulated supply is a necessity."

Coöperation Essential.

In the March number of *Health News*, the bulletin of the New York State Department, is an article on "Fly Control" by Dr. E. P. Felt, State Entomologist, from which the following is quoted:

"A fly campaign should be planned on broad lines and the enemy attacked at every vulnerable point. Such an undertaking is successful only when it receives general support. This must be secured through a widespread knowledge of the true character of the insect and the practicability of control of measures. It is primarily a campaign of education. Flies are an impossibility without a nearby breeding place or exceptional means of conveyance. They ordinarily breed within a few hundred feet of places where they are very abundant. Those who see the possibilities must coöperate. The school children or other groups, such as boy scouts, may do much for the cause. The city or village should be divided into districts, each in charge of an active leader and an earnest effort made to bring all up to a desired standard. Practical limitations should be recognized at the outset and every individual induced to go as far as possible without coercion. Large expenditures are not necessary for a successful campaign. Most people are willing to do the right thing if they can only see the reasonable side of the proposition.

"One practical line of work was illustrated in the campaign against flies in Greensboro, N. C. The stable keepers were interviewed by boy scouts and invited to sign slips, the first of which was an agreement to clean out the stable and haul the manure away each week during the warm season; the second

submitted, in case the first was not accepted, pledged the stable keeper to give the manure to some person who would do this, and the third, in the event that neither of the preceding were satisfactory, obligated the party to have the horse stable well cleaned and bedded with pine sawdust during the summer months. In other words, there was a concerted effort to get every man to go as far as he would in remedying conditions now recognized as insanitary and therefore a menace to the welfare of the community."

The Maggot Trap.

Following the same line of investigation as that reported by Doctor Levy, of Richmond, last year, the Department of Agriculture has recently published a bulletin on the "maggot trap." It is suggested that the unfavorable results obtained by Doctor Terry of Jacksonville were caused by the dryness of the manure used. Whether the cost of the construction is warranted by the results obtained, especially with the carelessness with which the apparatus would be used, ordinarily, is a matter of very much doubt to the writer.

The following brief account of the method of construction is borrowed from a note in the *New York Medical Journal* of March 21.

"A trap to destroy the maggots of the typhoid or housefly before they develop into winged insects is a possible solution of the fly problem and one that should interest health officers, sanitarians, and others who might make use of it on manure heaps where this common pest breeds. The Department of Agriculture's scientists have succeeded in destroying from seventy to ninety-nine per cent. of the maggots in a pile of manure. A large galvanized iron pan, measuring five by three feet, with sides four inches high, was made. In this stood a container on legs eight inches high. This container measured four by two by two feet. The sides and bottom were of heavy wire, one quarter inch mesh, supported by a light wooden framework. Twelve cubic feet of manure well infested with eggs and larvæ were placed in this container and sprinkled with water. Water was also poured into the pan below to the depth of about one inch. Surrounding and covering both pan

and container was a fly tight inclosure made of a large cage, six by six by six feet. This prevented further infestation of the manure, and an arrangement of traps at the top of the cage made it possible to capture and keep a record of any flies that might emerge. At the time for the emergence of flies the sides of the cage were darkened with black cloth in order to drive the flies into the traps at the top. Each day the maggots were collected from the pan and counted, and each day the manure in the container was sprinkled thoroughly with water and the pan was washed out and again partly filled with water to drown the larvæ which fell into it. From ninety-eight to ninety-nine per cent. of the maggots were destroyed, if the manure was kept moist; from comparatively dry manure about seventy per cent. were destroyed."

Religion vs. Health.

The May 23 issue of the *Weekly Bulletin of the New York Department of Health* contains the following note on the sanitation of the ceremonial baths of the Jewish synagogues:

"A conference called by the commissioner of health met last week to consider the subject of Mikveh's cleansing pool baths whose regular use is required by the Jewish faith. These pools have recently been made the subject of a bacteriological investigation by Dr. Manheimer of Columbia University and independently by the department of health. They showed that the Mikveh pools, as at present conducted, are a serious menace to the health of the people using them, and indicated the need of steps to render them sanitary.

"While no definite program has yet been formulated, the department feels that the enforcement of regulations similar to those recently adopted for floating baths would prove feasible. These provide for a preliminary cleansing shower bath and include regulations regarding the cleanliness of the water in the pools. The problem has been presented to the Board of Authoritative Rabbis of the Jewish Community of New York City with request that they submit suggestions to the department in the near future."

The grace with which the Protestant

churches yielded to the suggestion of sanitarians in the matter of replacing the common communion cup by individual cups may well be copied by the Jewish authorities. Following the same line, an investigation of the sanitary aspects of the use of holy water in Catholic churches may well be undertaken. We enthusiastically condemn the bathing in the Ganges and the kissing of the Kaabah as a means of spreading cholera but are inclined to neglect our own religions.

State Tenement House Law.

"Twenty-one towns in Massachusetts have now adopted the State Tenement House Law for Towns. In two cities, Springfield and Worcester, an active campaign is being waged to secure the adoption of the State Tenement House Law for cities. In both towns and cities the chief bone of contention seems to be the wooden three-decker tenement house, which these laws practically prohibit. In the towns, the prevailing sentiment is strongly against such structures, which have not yet secured a strong foothold but which threaten to appear in numbers, depreciating property values and changing the social life. In the cities, the prevailing sentiment seems to be the other way as many Massachusetts cities are already predominantly three-decker cities and consequently the three-decker, despite its admitted faults, has become a vested interest whose owners are numerous enough and influential enough to successfully resist any but the most determined attacks."

Housing Betterment, April, 1914.

School Inspections and the Family Doctor.

Not infrequently there is a veiled but evident opposition to the introduction of medical inspection of school children from the general practitioner who has not investigated the matter and fears that it will cut down his practice. Where it has been tried, however, it is found that the reverse is true as the following note from a recent issue of *The Medical Officer* testifies:

"That school medical inspections have definitely affected the practice of family doctors all over the country is an opinion advanced

by Dr. A. D. Edwards, M. O. H., in his last report as school medical officer for Bournemouth. He points out that, through the inspections, parents are now aware of the advantage of treating early handicapping ailments such as adenoids, and so they take their children for treatment of these conditions to medical practitioners, who pass them to the hospitals in large numbers. 'It is evident,' says Dr. Edwards, 'that the institution of school medical inspection has a wider significance than that of the diagnostic work of the medical inspector; its institution has influenced the practice of every doctor and will increase the chance of health of every child in the land, rich or poor.'

New Houses and Health.

"New houses are constantly offered for rent in large numbers in the United States and real-estate agents are naturally desirous to fill the houses on their lists with tenants as soon as possible. Probably a little investigation would show the desirability in this country of requiring a certificate that a new house will not endanger the health of its occupants before families are allowed to move into it. Such municipal regulations are proving valuable in England. Toward the close of 1912 the Portsmouth (England) corporation decided that thereafter no new building intended for human habitation in that borough should be occupied until it had been certified as sanitary in every respect. Dr. A. Mearns Fraser says: 'The principal evil that it will prevent is the occupation of houses before they have had time to dry.' He adds: 'I would far sooner live in a house with defective drainage than in a damp house; the results from the latter are more insidious in their onset and more difficult to overcome. Dampness undoubtedly greatly favors the incidence of consumption, bronchitis, rheumatism, heart-disease and diphtheria. Probably children are more susceptible to the ill effects of damp houses than adults.' The departments of health of our cities might well take up this question. Probably most American municipalities already have the legal power necessary to require such certificates and the question is only one of

making the regulation and establishing the custom."

Journal of the American Medical Association, May 30, 1914.

"Disease Can Be Spread by Transfer Slips."

Under the above impressive heading, the *Bulletin of the Health Department of Louisville, Ky.*, prints the following:

"We have a system in Louisville of paper transfer slips on the street cars. These innocent looking, gayly colored bits of paper are sometimes the carriers of dangerous diseases. The explanation is quite simple. The slips are furnished the conductors in small pads, and it is usually difficult to separate them when only one is wanted. Consequently the conductor wets his thumb in his mouth, takes hold of the transfer slip, tears it off, and passes it on the passenger probably with a deposit of dangerous bacteria, from the secretions of his mouth.

"It is no uncommon thing to see a passenger holding his transfer slip between his lips. This is particularly true of women, owing to the difficulty of opening their purses. If an individual is infected with tuberculosis, diphtheria, grippe, syphilis, a common cold, etc., the germs of the disease are found in the mouth secretions. If transfer slips are held in the mouth, and they have previously come in contact with the mouth secretions of another individual, there is great danger of disease infection.

"In some progressive cities with a high standard of hygiene, each street car conductor is furnished with a small wet sponge fastened to a tray which also contains the pads of transfer slips, thus avoiding the possibility of disease being spread in this way.

"DON'T PUT TRANSFER SLIPS IN YOUR MOUTH!"

That disease might be carried by transfer slips we cannot deny. That it has been thus carried we probably cannot prove. That the small sponge suggested above, exposed to the dust of the car and the spray from sundry coughs and sneezes, would be an improvement we must doubt. Putting transfer

slips in the mouth is a far greater affront to decency than to sanitation. The person who sneezes or coughs in public without covering his mouth and nose closely and with his handkerchief, not his hand alone, is still more indecent and, doubtless, far more dangerous to the health of those about him.

Camp Sanitation in Mexico.

The Engineering Record has been fortunate in obtaining for publication its issue of May 16 an article by Surgeon-General Gorgas, formerly of the Canal Zone, on United States Army Camp Sanitation in Mexico. The article discusses the prevention of camp diseases and takes up especially the most up-to-date methods of obtaining pure water, of disposal of excreta and other refuse, and of the prevention of flies; as well as other more general topics. It is a discussion of considerable interest to any reader and is especially important for those whose work includes the control of temporary camps of any sort.

The Negro and Public Health.

That the negro may stand in another relation to public health than merely as a menace is indicated by the following clipping from *The Southern Workman* (May, 1914), a magazine published at Hampton Institute in the interests of the negro and indian.

"Last year over 130,000 heads of negro families engaged in the clean-up day campaign which was organized by some of the thoughtful negro leaders who have the confidence and respect of white and colored Virginians. The great possibilities for good to all the people of the Old Dominion, especially to the colored people, shown by the results of last year's clean-up day, convinced the Negro Organization Society that it would be well to devote at least a week this year to the work of cleaning up backyards, houses, barns, outhouses, schools, and churches for the promotion of better public health.

"Before this issue of the *Southern Workman* reaches readers in distant states, thousands upon thousands of Virginia negroes will have taken an active part in getting rid of accum-

ulated rubbish and other disease-breeding elements.

"Major Moton, of Hampton Institute, who is the president of the Negro Organization Society, has made clear to many thoughtful men and women throughout the country that the public cannot afford to have negroes live amid insanitary surroundings. The principle of self preservation demands that white men and black men must work together for the improvement of the living conditions of those who play a large part in the care of white children and white families.

"That the negro leaders in Virginia have succeeded in winning the coöperation of the State Board of Health, the white and colored papers of Virginia, and other agencies that help to create public opinion, shows clearly the reasonableness and usefulness of the public health work which has been undertaken by the Negro Organization Society of Virginia."

Quarantine Regulations in the Canal Zone.

The Canal Record, published by the government at Ancon, Canal Zone, contains in its issue of June 10 the latest additional quarantine rules and regulations of the Zone and the cities of Colon and Panama. These regulations are the more interesting in view of the recent alarm in regard to the possibility of the canal becoming a menace to the health of the United States.

They include special regulations on account of cholera, yellow fever, plague, smallpox, typhus, and leprosy, both foreign and local; advisory requirements for vessels at sea; and a detailed statement of the disinfectants authorized by the United States quarantine regulations, and the proper methods of generating and using the same, and of agents for the destruction of rats, mosquitoes, and other vermin.

To Prevent Suburban Slums.

With the great influx of foreigners to our shores comes the growing question of how to take care of them properly. With this problem has come what might be called

the science of city planning. *Housing Betterment* for April, 1914, says on this subject:

"One of the most important powers a city can have, if it is to prevent the development of slum areas in the future, is that giving it the right to control the layout of streets beyond its borders. The size of blocks and the width and arrangement of their boundary streets often exercise a determining influence on the character of the housing. The lot unit is largely determined by the block unit. If the block is too wide, the lots will be too deep and the coming of rear dwellings can safely be prophesied unless the city has reserved a right of way for a new street through the middle of the block which may be opened when the district loses its suburban character. If the street is too wide and expensive, land overcrowding and the erection of tall dwellings to carry the burden are almost inevitable. On the other hand if the streets are too narrow, or if no main arteries are provided, or if the lot units are too small, the speculators may make quick sales to small buyers, but the city will have a long future full of trouble when it absorbs the new, misfit development.

"Toronto has provided against all these difficulties by securing a city and suburbs planning act which gives it the power to control all subdivisions within five miles of the city limits, with respect to the width and number of streets and the direction in which they run, and the width and depth of lots. Though this act became effective May 4, 1912, the Toronto Civic Guild calls attention to it once more lest its possibilities be overlooked. Pennsylvania has a similar law for cities of the third class, giving them jurisdiction for three miles beyond their borders."

Sanitation in the Library of Congress.

"Public towels have been banished from the Congressional Library, and in their place have been substituted paper towels. But the public drinking cup is still in evidence. This must seem somewhat of an anachronism to visitors who have ridden to the capital in cars in which the government has abolished by law the public drinking cup. If the rail-

way companies should furnish public drinking cups for their patrons, they would be punished by Uncle Sam; but in his most ornate building, Uncle Sam himself still displays the public cup. When the attention of the librarian was called to this discrepancy, he replied that the management was endeavoring to find some device that would be *sanitary and yet esthetic*. Until Miss Sanitation can appear attired in garments that harmonize with the surroundings, she must not show herself in the great library building. Esthetics first."

Life and Health, April.

The Milk Consumer.

In our efforts to improve conditions of milk supply and educate the producer, the consumer is often neglected. This is unfortunate since the consumer is almost always ignorant of the proper way to handle milk after he has received it. From the April issue of the *Portland Health Bulletin*, come the following "Don'ts" for consumers:

"Don't take milk from your dairyman unless it is in bottles.

"Don't leave milk where it will be exposed to warmth. Remove it to a cool place, all entirely away from all vegetables.

"Don't remove the cap from the bottle

nor pour the milk out without wiping off the top of the bottle.

"Don't replace the cap on the bottle of milk after it is once removed; place a clean glass or cup over the neck.

"Don't pour milk back in the bottle from pitcher; take out only enough for the meal.

"Don't neglect to ring up the Milk Department at the City Hall to find out about your milk supply."

Sanitary Comparisons.

"It is with a great deal of regret that American health officers are compelled to admit that European cities are more careful to observe sanitary regulations. The result is the cleaner and better kept foreign city which the American tourist so often speaks of. People so often resent the timely advice of health officers, and worse, refuse to accept it, which tends to prove the contention that education of the general public along sanitary lines is the phase of health work which needs the most emphasis.

"If the public-spirited individual who founded the hospital had devoted the same amount to the prevention of disease, the returns would have been many times greater. What an investment this would be!"

Health Bulletin, Portland, Ore., May.

PERSONAL NOTES.

The following persons were elected to membership in the American Public Health Association June 24, 1914:

C. Ward Crampton, M. D.; Francis Brown Grinnell; Harry M. Kay, M. D.; Fred W. Luening, M. D.; Joseph Edward Raycroft; George D. Ruhland; William Davison Stovall, M. D.

Mr. Stephen DeMerritt Gage has resigned from the position as biologist at the Lawrence Sewage Experiment Station of the Massachusetts State Board of Health, which he has held for so many years, to accept the position of chemist to the Rhode Island State Board of Health. Address, 310 State House, Providence, R. I.

Dr. C. H. Clair Drake, assistant chief of the Bureau of Vital Statistics of the Chicago Department of Health, and since 1909 editor of the department bulletin, has resigned from his position to become secretary of the Illinois State Board of Health.

The State Board of Health of North Carolina has secured Dr. L. B. McBrayer of Asheville to take charge of all the antituberculosis work of the state, including the management of the sanatorium. Doctor McBrayer has been employed as health officer of Asheville and has made a great success of his work there, in addition to taking an active part in medical and sanitary work throughout the state.

Another addition to the forces of the North Carolina health work is in the person of Dr. Merrill E. Champion who is employed in the field force of the Hookworm Commission. Doctor Champion holds an A. B., and an M. D. from Harvard and a C. P. H. from the new School for Health Officers. For the past eight years he has served as health officer of Arlington, Mass.

Mr. Max J. Colton, health officer of the city of Summit, N. J., has resigned from that position to become health officer of Cumberland, Md.

INDUSTRIAL HYGIENE AND SANITATION

Industrial Insurance.

In the June 5, 1914, number of the government *Public Health Reports*, J. W. Schereschewsky, surgeon, United States Public Health Service, discusses the question of industrial insurance and its relation to the medical examination of employees and prevention of sickness. He believes that the efficiency of the social unit is more determined by his physical condition than by anything else. And it is only recently the idea that inefficiency, due to ill health, is a burden which ought to be borne by the whole of society instead of by the individual. Therefore industrial sickness insurance becomes a logical means by which society may equitably distribute these costs resulting from physical inefficiency. The first aim of industrial insurance should be to prevent illness, rather than pay the costs of preventable diseases and disabilities.

To use Doctor Schereschewsky's own words:

"Granted, then, that systems for industrial sickness insurance, in common with other public health work, should rest upon a preventive basis, the primary object of such insurance would be to detect incipient defects and diseases among workers, or to prevent the development of diseased conditions by proper precautionary measures. It is evident that this object will be most readily attained by means of the frequent periodic physical examination of employees and an inspection of their environment. In no other way can the first beginnings of disease be so readily detected, or the adverse influence of unhygienic conditions averted. It is to be understood, of course, that we are not to rest content with the mere detection of such incipient defects and diseases, or of unhygienic conditions among workers, but their discovery should go hand in hand with an earnest effort to discover the adverse factors at the root of the matter. The inquiry, therefore, is not to be terminated until the offending condition has been removed

and progress has been made toward renewed health and efficiency."

Therefore, from the above and other arguments Doctor Schereschewsky feels justified in drawing the following conclusions:

1. Industrial sickness insurance is an economic necessity in modern social evolution.

2. The basis upon which industrial insurance should rest is the prevention of illness and physical disabilities.

3. Frequent periodic physical examinations of workers constitute the logical means by which defects and diseases can be detected in their incipency.

4. The scope of such examinations should be extended to include home as well as factory conditions.

5. Industrial insurance based upon preventive measures should redound greatly to the benefit of society.

- (a) by reducing the annual loss of time through illness;

- (b) by establishing hygienic standards;

- (c) by establishing minimum hygienic standards for industries;

- (d) by favoring the enactment of uniform industrial legislation;

- (e) by increasing the efficiency of local health authorities.

6. The cost of carrying industrial insurance based on preventive principles should be less than that of present systems.

"First Aid to the Uninjured."

"The vogue of the term 'Safety First' shows that the public conscience has really awakened. It means war on the impairment of human strength, the maiming of human bodies, and the destruction of human life that have accompanied the enormous modern growth of railways, factories, mines, and works of construction.

"The term of course covers everything that is being done to make industry and travel safer, from improved life-saving apparatus to 'campaigns of education' for employees and the general public. Safety devices

are no substitute for intelligence and faithfulness. Yet the standard of safety to be striven for on the mechanical side through invention must be set as high as the standard to be sought on the human side through education.

"Of course the human side remains the more important, as well as the larger and the more complex. The American Museum of Safety now awards annually six medals: the E. H. Harriman medal goes to a steam railway for 'progress in safety and accident prevention'; the Anthony N. Brady medal to an electric road, for 'accident prevention and industrial hygiene'; the Travellers' Insurance medal is awarded to an American employer 'for protecting the lives and the limbs of his employees'; the Louis Livingston Seaman medal is given 'for progress and achievement in the promotion of hygiene and the mitigation of occupational diseases'; the Rathenau medal is for 'the best device or process in the electrical industry for safeguarding industrial life and health'; the *Scientific American* medal goes this year to a marine equipment company 'for new types of life-saving apparatus.' The greater part of the success of the man or the corporation that wins any one of the first four of these medals must be owing to the kind of educational work that the Safety First Association calls 'First Aid to the Uninjured.'

"Since one of the claim agents on the Chicago & North Western Railway a few years ago succeeded, by an educational campaign of twenty-eight months, in reducing the number of deaths on the railway by almost one-quarter, and the number of injuries by more than a quarter, bureaus of safety have been organized on railways that together own more than half the mileage in the United States.

"It is easy to imagine most of the forms that this educational work takes, but one of the latest forms is new. The bureau of safety of the Union Pacific Railroad has put together on one large placard seven photographs that show the different ways in which children risk life and limb when they trespass on railway property, and has hung a copy in every schoolhouse in Nebraska along the line of the railway. It also issues periodically short arti-

cles on 'Accident Prevention,' and distributes them in the schools. The experiment has the hearty coöperation of the school authorities.

"There is no royal road to safety, any more than there is to any other desired end. Education often seems a roundabout way of approach, but it is the one sure way."

Youth's Companion, April 9, 1914.

Dust as a Predisposing Factor to Tuberculosis.

The *Health Bulletin* of the North Carolina State Board gives the following report of some investigations of the relation of dust to tuberculosis but unfortunately fails to quote its authority:

"The following interesting experiment was recently performed on guinea pigs to determine, if possible, the effect of dust as a predisposing factor in tuberculosis of the lungs. A lot of guinea pigs were subjected to dusty air from two to four hours daily for ten weeks. At the end of that time part of these pigs, as well as some other pigs that had not been subjected to the dusty air, were infected with the germs of tuberculosis. The results obtained were as follows:

"1. The guinea pigs subjected to dust, but not infected with tuberculosis, lived and showed no unfavorable conditions even after an autopsy.

"2. A number of guinea pigs were infected with tubercular germs but not previously submitted to dusty air. Almost all of these got well from the tubercular germs.

"3. All the guinea pigs which had been subjected to the dust and which were later exposed to the tuberculosis injections died of violent pulmonary tuberculosis (consumption).

"In some this was a rapid process; in most cases it was slower. The animals wasted away steadily and did not suffer death until two or three months had elapsed after the injection. In all these cases autopsies showed grave tubercular infection of the lungs.

"The results of this experiment show that dust in itself without the germs of consumption does but little harm, but when dust is accompanied by germs of consumption it is almost sure to bring on consumption."

The Cost of Safety.

Just as in all lines of public health conservation it is necessary to estimate the efficiency of any measure under consideration and determine whether the saving warrants the expenditure so in the case of accident prevention. The following note from the *Engineering Record* (June 6) points out the fact that the public pays for safety measures in industry less directly but just as surely as if they were bought with the income from a tax or by the appropriation of the health department.

"Addressing the master boilermakers at their recent convention at Philadelphia, Ivy L. Lee, executive assistant of the Pennsylvania Railroad, pointed out that, important as is the safety of the individual, reason and justice impose sharp limitations on the financial burdens to be put upon society to bring about such safety. As he states it, safety must be paid for out of income; otherwise principal is spent and resources are exhausted. Having done this, ordinary safety measures, obviously, cannot be paid for. Therefore it is only feasible to protect man up to a certain point and then make him look out for himself or assume the risks. Otherwise, as Mr. Lee says, we would never transport dynamite or even cross a street. Because families frequently burn to death in their homes, we would allow only fireproof construction, and would close buildings that were not fireproof. This would raise rents beyond the reach of the majority of dwellers. So it is with the railroads. Mr. Lee admits that 'Safety first' should be the motto of every railroad, and surely the road he represents cannot be accused of laxity in this respect. But the motto of many legislative demagogues, 'Safety at any cost,' will bring disaster if carried to extremes. It is reasonable to demand that in new installations railroads not utterly bankrupt should use the safest designs known, and that they should carry out a program for replacing unsafe equipment as rapidly as possible. It is not reasonable to expect them to replace all wooden cars with steel at once, equip all their lines with block signals in a year, or eliminate all grade crossings forthwith at their own expense. The railroads—

that is, the public who foot the bills—have not the money to pay for these things, and the mechanical safety obtained for individuals would be far more than offset by the social danger of financial paralysis."

Voluntary Sanitary Standards in Industry.

"Every new sanitary regulation of industry is denounced by well-meaning individualists as an invasion of personal liberty. In a society composed wholly of enlightened and altruistic individuals, there would be little need for legislation of this kind; but under present conditions those who advocate the adoption of restrictive laws usually do so in the belief that carefully considered social legislation tends, in the long run, to increase the value of human life and to promote the welfare and progress of the race.

"While individualists believe that regulative legislation has been overdone, the voluntary organization and successful activity of such a body as the Joint Board of Sanitary Control of the Cloak, Suit and Skirt Trades, and the Dress and Waist Industries of New York City—in other words, the banding together of employers and employees, in a huge industry, for the sanitary regulation of its manufacturing establishments—is an indication that in some quarters, at least, the need is recognized of establishing working standards over and above those which are legally enforced. If employers and employees in large industries generally would get together in this way the work of social reformers would be largely supplanted, and the activities of boards of health and of other state and municipal departments would be materially diminished. Among the commendable sanitary rules which have been voluntarily adopted by the Joint Board of Sanitary Control are the following:

"1. No shop to be allowed in a cellar.

"2. Fireproof receptacles, lined with tin and having a tin cover, to be provided in sufficient numbers for rubbish.

"3. Halls and stairways leading from shops to be adequately lighted by natural or artificial light.

"4. Sufficient window space to be pro-

vided for each shop, so that all parts of the shop are well lighted during the hours from 9 a. m. to 4 p. m.

"5. Where gas is burned, arc lights or incandescent mantles should be used.

"6. All lights to be well shaded, to be placed above operatives, and not too near them.

"7. At least 400 cubic feet of space, exclusive of bulky furniture and materials, should be provided for every person within the shop.

"8. The shop should be thoroughly aired before and after work hours, and during the lunch hour, by opening windows and doors.

"9. Walls and ceilings of shops and water-closet apartments should be cleaned as often as necessary, and kept clean.

"10. Floors of shops, and of water-closet apartments, to be scrubbed weekly, swept daily and kept free of refuse.

"11. Water closets to be adequately flushed and kept clean.

"12. A sufficient number of water-supplied wash basins to be provided in convenient and light locations within the shop.

"13. All waste materials, cuttings and rubbish must be removed twice a day from the floor of the shop and once a day from the building.

"14. In all shops where more than twenty-five women are employed, provision should be made for rest and emergency rooms for their use."

Bulletin of the Health Department of New York City, May 23, 1914.

Cannery Labor Camps.

The Industrial Board of the Department of Labor of New York State have issued very interesting and valuable pamphlet, entitled "Rules and Regulations for the Sanitation of Living Quarters in Cannery Labor Camps." The sanitary regulation of labor camps of

various kinds has come to be studied more and more of late years. Therefore this set of rules ought possibly to be of some assistance to others studying the question.

The rules are taken up under various heads some of which are specifications as to the construction of the buildings, floors, air space, windows, kitchen and dining-room, beds, privies and water closets, water supply and drainage.

The second part of the rules deals with the maintenance of the houses, the cleanliness of the rooms, privies and bedding; the disposal of refuse and garbage, duties of caretakers, etc. To make the regulations complete the state law authorizing the rules, is quoted.

Drink and Work Accidents.

"Workmen frequenting drinking places coming to or going from their work will be replaced by non-drinking men as rapidly as possible."

"This notice, posted in the American Car and Foundry Company's plant at Berwick, Pa., has resulted in a marked decrease in accidents among the 5,000 men employed there. It was put up following the visit to Berwick of the Rev. Henry W. Stough, who conducted a vigorous crusade against the drink evil.

"The meetings by Doctor Stough were held at the end of October and the beginning of November. Since that time, it is asserted, accidents have been reduced 34 per cent. The output in the passenger car department has been increased from one and one-half cars a day to two cars, with the same force employed. The bank deposits in the six weeks following the meetings were \$80,000 larger than in any other six weeks' period.

"It is reported that the judges in Berwick will refuse to grant any licenses in the town next year."

Survey, May 16, 1914.

CURRENT PUBLIC HEALTH LITERATURE.

AMERICAN.

Boston Medical and Surgical Journal.

CLXX, No. 18. April 30.

The Field Work of the Anti-Tuberculosis Association. S. H. Stone.

CLXX, No. 21. May 21.

Feeble-Mindedness as a Leading Social Problem. E. E. Southard.

Engineering Record.

LXIX, No. 22. May 30.

Smoke Abatement in Denver (abstract). F. E. Shephard.

LXIX, No. 23. June 6.

Water Purification at Cleveland.
Privately Owned Sanitary Sewerage System.

LXIX, No. 24. June 13.

Hypochlorite Treatment Now Firmly Established.

LXIX, No. 25. June 20.

New Water Supply for Waco, Texas.
Operating Results of Staten Island Refuse De-structors.

Violet Ray Sterilization for Niagara Falls Filter.
Changed Plan for Panama Water Supply.
Slow Sand and Mechanical Filter Costs. J. H. Gregory.

Report on Plan of Refuse Disposal in St. Paul.

Journal of the American Medical Association.

LXII, No. 21. May 23.

The Sources of Danger in Anti-Meningitis Serum, Pellagra and Infection.

Fatal Attack of Filarial Lymphangitis Simulating Bubonic Plague. I. G. Martinez.

LXII, No. 22. May 30.

Carbon Monoxide and Canaries in Mines.

The Death-Rate for 1913.

The Streptococci in Milk.

LXII, No. 23. June 6.

Typhoid Fever. C. O. Jordan.

Results from the Use of Living Lactic Acid Bacilli on Diphtheretic Throats in Two Groups of Cases. E. V. Golts and W. D. Brodies.

The Early Diagnosis of Lead Poisoning. H. Linenthal.

Practical Study of Goat's Milk in Infant Feeding as Compared with Cow's Milk. D. H. Sherman and H. R. Lohnis.

Large Cities as Health Resorts.

LXII, No. 24. June 13.

Recommendations as to Sanitation Concerning Employees of the Mines on the Rand, made to the Transvaal Chamber of Mines. W. C. Gorgas.

LXII, No. 25. June 26.

Hookworm Disease: Its Ravages, Prevention, and Cure. J. A. Ferrell.

The Germicidal Activity of Calomel. J. F. Schamberg.

The Transmission of Typhus Fever.

The Prophylaxis of Tetanus.

Municipal Engineering.

XLVI, No. 6. June.

The Water Works of Bridgeton, N. J.
Progress in Water Works Purification.

The American City.

X, No. 6. June.

Malaria as a Field for Philanthropy. W. H. Deaderick.

The Combined Treatment of Tuberculosis and Poverty. J. A. Kingsbury.

The American Journal of Clinical Medicine.

XXI, No. 6. June.

The Diarrheal Diseases of Infancy and Childhood. Geo. F. Chandler.

The Therapeutic Use of Living Bulgarian-Bacillus Cultures. J. F. Biehn.

New York Medical Journal.

XCIX, No. 20. May 16.

The Need of Hospitals for Whooping-Cough in New York City. G. R. Pisek.

XCIX, No. 24. June 13.

Isolation. P. G. Woolley.

American Journal of Diseases of Children.

VII, No. 6. June.

Recent Progress in Infant Welfare Work.

Northwest Medicine.

VI, No. 6. June.

The Local Health Department. S. G. Paul.

Medical Inspection of Schools. E. O. Montague.

Public Health Reports.

XXIX, No. 22. May 29.

Plague and Filariasis: The Possibility of Mistaking One for the Other.

Industrial Conditions: Their Relation to Public Health. B. S. Warren.

Trachoma in Kentucky. J. H. Oakley and Dunlop Moore.

XXIX, No. 23. June 5.

Industrial Insurance. J. W. Schereschewsky.

XXIX, No. 24. June 12.

Reorganization of the Minnesota State Department of Health.

Public Health Administration in Baltimore. Carrol Fox.

XXIX, No. 25. June 19.

The Reporting of Disease—The Next Step in Life Conservation. L. I. Dublin.

Sanitary Work in Vera Cruz During the First Three Weeks of the American Occupation. G. M. Guiteras.

Plague in Hawaii. Geo. W. McCoy.

Southern Medical Journal.

VII, No. 6. June.

Pellagra. R. E. Sylvester.

The Negro, a Public Health Problem. C. E. Terry.

Journal of Experimental Medicine.

XIX, No. 5. May.

Further Observations on the Growth of Bacteria on Media Containing Various Aniline Dyes, with Special Reference to an Enrichment Method for Typhoid and Para-Typhoid Bacilli. Chas. Krumwiede Jr. and J. S. Pratt.

FOREIGN

Dublin Journal of Medical Science.*III, No. 509. May.*

- Typhus: Its Etiology and Treatment. D. K. Milne.
Notification of Tuberculosis in Ireland. Its failure. J. Moore.

Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege.*XLVI, Part 2. 1914.*

- The Hygiene of International Trade and its Domestic Significance. O. Tjada.
The Systematizing of Social Hygiene. A. Elster.

Zeitschrift für Hygiene und Infectious Krankheiten.*April.*

- The Sterilization of Water by Ultraviolet Rays. A. Silberman.

British Medical Journal.*No. 2787. May 30.*

- Further Investigations of the Type of Tubercle Bacilli Occurring in Sputum of Phthisical Persons. A. S. Griffith.

Journal of the Royal Sanitary Institute. London.*XXXV, No. 5. June.*

- The Certification of Milk and Its Effect on the General Milk Supply. W. Buckley.
How Winnipeg's Milk Supply is Supervised. P. B. Tustin.
Drainage and Sanitary Fittings in Canada. F. J. O. Smith.

Journal of State Medicine, London.*XXII, No. 6. June.*

- Occupational Fatigue. Sir Thomas Oliver.
The Housing of the Irish Working Classes. R. F. Heron.
The Practice of Disinfection in Tuberculosis. F. Marie Davy.

Lancet, London.*CLXXXVI, No. 4730. April 25.*

- Vaccination Against Hay Fever. John Freman.

CLXXXVI, No. 4734. May 23.

- The Diagnosis of Tuberculosis. The Value of Besredka's Antigen in the Complement Fixation Test for Tuberculous Disease. A. C. Inman.

Medical Officer, London.*XI, No. 21. May 23.*

- Some Considerations in the Control of Measles. A. Smith.

XI, No. 22. May 30.

- The Imperial Health Conference.

XI, No. 24. June 13.

- Enteric Fever: A Consideration of Experience Gained on Southwest Germany. W. H. Hamer.
Teaching of Sex Hygiene in the Schools.

Münchener Medizinische Wochenschrift.*LXI, No. 17. April 28.*

- Danger from Diphtheria Carriers. G. Riebold.
The Teaching of Social Hygiene in the University of Munich, and the Establishment of a Social Hygiene Seminar. Kaup.

LXI, No. 18. May 5.

- Smallpox and Vaccination: Their Common Influence. Baümler.

LXI, No. 19. May 12.

- On Paratyphoid of Children in Munich. Breuning.

Presse Medicale, Paris.*XXII, No. 39. May 16.*

- Alimentary Infections by the Gärtner Group of Bacilli. A. Luba.

Public Health, London.*XXVII, No. 9. June.*

- Human and Bovine Tuberculosis in Children. E. J. Steegmann.
Hospital Isolation of Scarlet Fever. W. St. McClure.
The Infectivity of Tuberculosis.

Tropical Diseases Bulletin, London.*III, No. 8. May 16.*

- Amoebiasis and Dysentery. Cholera. Leprosy.

Deutsche Medizinische Wochenschrift.*XL, No. 15. April 9.*

- Malaria in Southwestern Germany. Malisch.
The Use of Vaccine for Gonorrhea in Children. R. Hamburger.

Archiv für Rassen- u. Gesellschafts-Biologie.*X, No. 5. 1913.*

- The Studying out of Biological Statistical Problems. W. Weinberg.

AMERICAN JOURNAL OF PUBLIC HEALTH

APPLICATIONS OF WATER ANALYSIS.

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Address of Acting Chairman, Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

The practical side of any subject appeals to the majority of people so that the question most frequently in the minds of those who are informed that water analyses are being made is, "What is the use of water analysis?" A brief answer to the question would be that a water analysis is made for the purpose of safeguarding the health or of saving money. Often the first of these reasons is explained in terms of the second for it is often necessary to appeal to the pockets of the voter in order to obtain sufficient means for safeguarding the health of a community. Because of the two points above mentioned, water analysis naturally divides itself into sanitary water analysis and what we might call "commercial water analysis." The members of the laboratory section of the American Public Health Association are familiar with the applications and advantages of a sanitary water analysis. They are also familiar with the analytical data of the so-called mineral waters and with their therapeutic uses. Possibly many of them have not thought of the commercial applications or of the related analytical work which a water analyst may be called upon to perform. A brief statement concerning some of the other work that may be done by the water analyst should be of interest.

The Illinois State Water Survey is authorized by law to make any investigations that will enable the citizens of the state to obtain and maintain an abundant supply of water for domestic or manufacturing uses. It is not under the control of a board of health and is therefore called upon to perform analytical work not only to safeguard the health but is also called on to make the so-called "commercial analyses."

It is the purpose of the Survey in its sanitary water analysis to make analyses that will enable the citizens of the state to *obtain* and *maintain* both public and private water supplies in a state of purity. While analysis

may be made of a water supposed to have caused typhoid fever or other water borne diseases, the Survey recommends that other possible causes be investigated before the water analysis is made. Chemical, bacteriological, and microscopical examinations are made according to regular approved methods, which it seems hardly worth while at this time to discuss in detail.

It is especially the applications of water analysis not directly related to the public health that I propose to describe.

The analyst is often called upon to assist municipal authorities in their choice of a water for their supply. Two or more sources of supply may be available, all of which are either pure or can be readily purified to meet sanitary conditions; then there arises a necessity for the determination of the mineral content. The experience of the city of Belleville, Illinois, is an example of what happens. For years it had used water from deep wells which was soft, though containing a considerable quantity of sodium salts. The supply being inadequate, it was necessary to increase the supply. This was done by drilling wells in the alluvial drift along the Mississippi River. The water obtained was much harder and was received by the housewives with much disapproval. The character of the mineral content has made it advisable to substitute the softer water of the Mississippi River.

The analyst is asked to determine the cause and suggest a remedy for corrosion in boilers and on the outside of water mains. An analysis of the mineral content will usually explain the cause of the corrosion in boilers and the proper amount of lime or soda ash to neutralize the corrosive ingredients can be readily calculated.

A water main near the spoil bank of a coal mine was badly corroded on the outside due to the presence of iron sulfate formed by the oxidation of iron pyrites in the waste from the mine. A protective coating or suitable drainage are remedies.

The analyst is asked to determine the cause and suggest a remedy for foaming in boilers. This trouble is usually found to be due to an excessive amount of sodium salts. The simplest remedies are either the careful blowing down of the boilers to prevent concentration, or a modification of the boilers to give ample steam space above the water line.

A very common complaint that reaches the analyst is that waters will form a scale in boilers or in hot water systems or even in the mains. The scale in boilers is due to the presence of carbonates of calcium and magnesium which form a soft scale and carbonates and sulfates of the same elements which form a hard scale. The best remedy for this difficulty is the construction of a softening plant to remove the carbonates and sulfates before the water enters the boilers. When this is not practicable, the use of the proper amount of a boiler compound may be recommended.

Scaling in the steam pipes of heating systems has been found to be due to ammonium carbonate. Some waters in Illinois contain large quantities

of ammonia and carbonates. These at the high temperature of the boiler are dissociated. In the cooler parts of the system they are reunited and cases have been reported to us where the pipes have been entirely clogged by crystalline ammonium carbonate.

The scaling in water mains may be due to incomplete reaction in water treatment with lime. The Survey has had brought to its notice a case where a 20-inch pipe has been reduced to a diameter of 8 inches because of this incrustation. It was suggested that solution in acid would remove the incrustation but the amount of acid required (84 tons) and the difficulties of application rendered this scheme inadvisable. The scale was removed much more economically by taking up portions of the pipe and chipping out the incrustation. To prevent scaling of this kind there should be arrangements for complete reaction of the lime in suitable mixing chambers and large settling basins before the water enters the mains.

Even in Illinois the analyst is sometimes called upon to give an opinion concerning the value of water for use in irrigation. Many available waters, especially from deep wells, contain large quantities of mineral matter making them unsuitable for irrigation. Complaints have come from the florists and gardeners. With proper drainage some highly mineralized waters may be used but it is the duty of the analyst to determine the conditions under which the water may be used.

One of the most important problems which the analyst is called upon to consider is the removal of iron. An experimental plant was constructed and operated for several months at the University of Illinois. With the particular water in question it was found that simple aëration and filtration would be satisfactory. However, after a plant was constructed and operated continuously it was found that the sand bed clogged very rapidly because of an enormous growth of crenothrix throughout the sand bed which made it impossible to wash the filters satisfactorily. The use of hypochlorite has been effective in killing the crenothrix so that the filters could be satisfactorily washed. A reduction of the iron from 2 parts per million to less than .05 parts per million has been effected.

Specimens of service pipes almost entirely clogged with a black powder have been brought to the analyst for examination. These powders have contained considerable proportions of manganese. An examination of the water from the sources from which the supply was obtained has showed small quantities of manganese in the original water. The recommendation in one case where the source of supply was from a reservoir fed by springs was the construction of a filter and a softening plant. The recommendation in another case where the amount of manganese in the water varied from .01 parts per million to 1.2 parts per million in six wells, was the use, as far as possible, of the water containing the small quantities of manganese.

In addition to the work done for the State Board of Health, the Illinois

State Water Survey has coöperated with other state departments, for example, with the State Laboratory of Natural History, The State Geological Survey, and the Rivers and Lakes Commission.

Examination of the Chicago Drainage Canal and the Illinois River to determine its condition as affected by Chicago sewage and to determine the probable effect on fish life was made in coöperation with the State Laboratory of Natural History. The condition of the river as indicated by the small amounts of dissolved oxygen confirms the observations of the State Laboratory of Natural History, that sewage organisms were present in abundance in the upper reaches of the river but gradually died out farther down. The fresh water organisms, both animals and plants, were entirely absent in the upper reaches of the river and began to appear farther down where self purification had taken place. Gases arising from the river have been analyzed and found in composition to resemble the gases from septic tanks and to differ widely from the gases from unpolluted swamps. The sludge in the river bottom shows interesting variations in the content of fat and nitrogenous organic matter.

A study of the relation of the composition of water to the strata has been carried on with the State Geological Survey. Wells in the northern part of the state and entering certain strata furnish a water suitable for domestic uses. Waters from deep wells to the southward, in strata corresponding to wells farther north, are so highly mineralized that it is impossible to use them for domestic supplies. By analyses of water from different strata, the analyst can advise the driller as to the proper arrangement of casing. From records he can prophesy the composition of water to be expected in new wells.

The Rivers and Lakes Commission of Illinois has power to hear complaints concerning nuisances caused by waste matters emptied into the streams of lakes of the state. Analyses of the water and sanitary surveys of the rivers of the state made by the State Water Survey are used by the Rivers and Lakes Commission.

The State Food Commission has taken up the study of the bottled waters.

From time to time various processes of water or sewage treatment are suggested. The examination of such processes by disinterested parties is valuable. Some of these processes have been tested in the laboratories of the Water Survey or have been examined in the field.

We have not as yet been able to install an experimental plant for the treatment of sewage but tests have been made on the local plants at Champaign and Urbana. The plant for the electrolytic treatment of sewage of Oklahoma City was visited by a representative of the Survey with the result that more successful operation must be shown before the Survey will approve the construction of similar plants in the state of Illinois.

An apparatus for sterilization of water by ultra violet rays is installed in

the laboratory and has been used successfully. Water softening with lime and soda has been carried out on a small scale. A slow sand filter and a rapid mechanical filter are installed in the hydraulics laboratory of the University and are available for special tests or for the use of students. A Permutit water softening apparatus has been purchased and given a thorough test in the laboratory of the Water Survey.

An article on the applications of water analysis would hardly be complete without a brief statement of some of the related work which can be done by an analyst in charge of a water works laboratory. If the plant be a filter plant he may make the analyses of sand to determine its availability for use in filters. From sand analyses the builders of filter plants have been assured that local sands could be substituted for special sand which must be shipped from a distance at a saving of several dollars a yard.

Practically all water works must use coal as a source of power. Analyses of the coal and the purchase on specifications will result in reduced operating expenses since the dealers may be checked in accordance therewith.

Some water analysts have effected savings by making analyses of oils, others by the analyses of the mineral content of the water and the mixing of suitable compounds to soften the water used in the boilers. In filter plants and water softening plants analyses of the alum, lime, soda and bleaching powder used enable the operator to obtain a better control of and to increase the efficiency of the plant.

If any conclusions can be drawn from the examples of work of a water analyst enumerated in this paper, the most important are that water analysis has wide applications and the analyst should have a broad and thorough training that he may be competent to study and solve many and varied problems.

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THE VALUE OF ROUTINE WATER ANALYSIS IN SANITARY SURVEYS.

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Read before the Laboratory Section, American Public Health Association, Colorado Springs,
September, 1913.

For forty years and more the chemical analysis of water has been a part of the routine of every chemical laboratory. The consulting chemist has done his work in a purely perfunctory way, content to report certain definite characteristics, and confident that his results would be understood by the person for whom they were intended. For a somewhat shorter period, bacteriological examinations have also been made on water samples and a satisfactory sanitary analysis is not now held to be complete unless both chemical and bacteriological data are determined.

The necessity for developing standard methods of work is obvious. Unless the skilled graduate follows certain definite paths he reaches no goal; unless his results are intelligible to his colleague, they are largely worthless; unless the sanitary officer is assured that the reports he receives are obtained by following certain procedures, he can place no confidence in them. For these reasons standard methods of water analysis have been suggested for years, and chemists and sanitarians, working through the committees of the chemical section of the American Association for the Advancement of Science, and later through the committee on standard methods of water analysis of the American Public Health Association, have culled out of the great mass of literature on the subject a few basic tests which have come to be accepted routine of all laboratories engaged in the examination of waters. Important as has been the work of these committees, essential as are the methods to the chemist, the acceptance of standard methods has undoubtedly restricted further research and given the analyst a too complete satisfaction that the tools, as it were, of his trade can not be improved, and that the results he obtains are the final estimate of quality.

In the course of my experience in the water laboratory, involving the analysis of some fifteen thousand samples of water from public and private sources, I have each year felt my assurance, that the work was sufficiently complete to warrant definite conclusions, diminish, and my faith in the value of the factors, nitrates, nitrites, chlorine, free ammonia, albuminoid ammonia, waver. The hundreds of samples shown to be chemically bad and bacterially good, or bacterially good and chemically bad, have increased my doubt as to the positive value of the results. Every chemist who has had more than a limited experience, has, I am sure, experienced

the same doubt and adopted, as we have ourselves done, the practice of classing as unsafe, waters which a single analysis, usually all that it is possible to obtain on isolated well samples, shows to be either chemically or bacterially out of accord with our accepted standards. Such interpretations, from the standpoint of the sanitarian, are the only safe interpretations, but they are not at all satisfactory to the chemist who knows that his action may condemn a potable water. Something more than laboratory results are essential, for the data collected for a well water of one part of the state might condemn it, while similar chemical factors might well be reliable evidence of potability in the case of water from another source. In New England high chlorines are almost undisputed evidence of sewage pollution, and the construction of isoclors was necessary before we could classify waters from various parts of the state. In the central states the chlorine content is of little moment unless complete information is at hand as to the source of the supply for thousands of square miles have been so filled with deep borings for gas and oil that the original salt content of both river and well waters has long since disappeared and the present factor is determined only by the amount of salt water from the lower levels that has mixed with the surface and near surface supply. The same explorations that have laden our streams and ground waters with salt have introduced other factors, unusual and sometimes with difficulty explainable. Abnormally high ammonia accompanied by very low nitrates and nitrites, conditions usually attributable to raw sewage, are not uncommon in well waters. Factors for nitrites, for iron and for hardness may depart widely from accepted standards and yet have no sanitary significance. And just as is the case with chemical data, so bacterial counts may fail to tell the whole truth. Water from the Ohio River at any point between Cincinnati and Evansville contains colon bacilli, and yet for years this water has been used for drinking and for domestic purposes by dwellers on both sides of the river and by crew and passengers on river boats. In view of what we know of the entrance of sewage into the stream, we are fully justified in condemning the water for drinking purposes, but is not such condemnation based more upon esthetic grounds than upon a study of chemical data, which in the lower reaches of the river is satisfactory, and of bacterial data which does not wholly coincide with the vital statistics of many river towns. All of these generalities, with their dubious import, but lead up to the question at issue, of what value are the routine analyses which form so large a part of the work of sanitary surveys?

In the last five years we have made elaborate investigations of the sanitary condition of the water of the southern end of Lake Michigan, of the Calumet River, the Ohio River for some three hundred and sixty miles, and the Wabash River from its source to its mouth, and we are at present completing our survey of the large water courses of the state by a similar

study of the White River from source to mouth. In all of this work we have followed the usual procedure originally laid down by the Massachusetts State Board of Health under Drown, by workers at the Massachusetts Institute of Technology, and accepted everywhere, in this country at least, as essential to satisfactory results. That is, on the thousands of samples analyzed, we have been careful to estimate nitrates, nitrites, chlorine, oxygen dissolved, oxygen consumed, hardness, odor, turbidity and sediment, and in addition we have made bacterial counts and the presumptive test for *B. coli* with frequent checks to positively identify the colon bacillus. Each year the labor involved in these elaborate analyses has seemingly become more oppressive, and especially since the results have in most cases been of so little moment.

We have been able to show in a graphic manner the rise and fall of chlorine content as a variable dependent almost entirely upon two factors, first, the inflow of salt water from oil wells, secondly, the variation of the flow of the stream. The chlorine content of streams draining the oil wells is abnormally high and varies according to the activity of the oil operators. The existence of such a source of chlorine destroys absolutely any value the chlorine factor might otherwise have in indicating pollution by the run off from inhabited areas.

The nitrate factor, long held of vital importance, has not in these surveys been of any special significance. Streams so loaded with sewage as the Ohio, Wabash and White Rivers show a surprisingly low nitrate content which varies so slightly following the introduction of fresh supplies of sewage as to be negligible in the interpretation of results.

The nitrite factor, of material value in the examination of well supplies and in the study of sewages, is of little moment in the analysis of river and lake waters, varying more widely during conditions of high and low water than because of the inflow of sewage or the oxidation of nitrogenous material. This observation does not hold true in the case of the Calumet River, or indeed the White River, streams so full of sewage in portions of their flow as to be little different from septic tanks. But it is certainly true of such rivers as the Ohio and the Wabash, and of lakes and impounded streams having a low organic content. It is unnecessary to point out the little value of alkalinity determinations, for while the engineer may find this factor valuable in determining the suitability of water for boiler purposes, a single analysis is as good as a thousand. The laundryman is mightily concerned in the hardness of his water supply, but he, too, needs no extended survey to furnish him the information he desires. Alkalinity values vary with the inflow of tributaries and with the rise and fall of the stream. Under certain conditions, obtaining in mining regions where acid waters are sometimes met with, this factor cannot be neglected by operators of filtration plants, and in such cases the data should be obtained by them as required.

Free and albuminoid ammonia contents cannot be held to be entirely negligible for they are of considerable value in indicating the condition of organic refuse. But they, too, in common with the other factors referred to, are variables depending more upon low and high water, temperature and normal vegetable growths than upon pollution, except in the case of waters so grossly contaminated as to be classed as dilute sewages.

We have found, however, in all of our work, that two factors are of prime importance and of great value, namely, dissolved oxygen and oxygen consumed. The amount of oxygen required to oxidize the organic matter present in a water varies directly with the organic content, and as we see it, is a very satisfactory indication of the condition of the river waters of the central states where algal growth is slight and where, in a large measure, organic matter is present as a result of the introduction of sewage and manufacturing wastes.

The oxygen-consumed content of a strongly colored pond water, so aptly described by Thoreau as "meadow tea," is extremely high, but cannot be interpreted as indicative of pollution. If, however, the factor is determined upon a river water naturally low in organic content, a high value has a positive meaning. It, too, is a variable, being influenced by turbidity factors and by the rise and fall of the stream.

The dissolved oxygen content is equally helpful and is of special moment if considered in connection with fish life. This factor varies surprisingly under different conditions of flow, naturally being heavier below falls, rapids and riffles than in quiet pools.

In all of our work it has been our desire to take samples from the same points as frequently as possible throughout a season, thus eliminating changes in composition due to wind and rainfall. We have been able to do this in the study of lake waters where by the use of buoys we could locate sampling points to be visited daily during a period of many weeks. But in the case of river surveys where the work done has been carried on in a floating laboratory, it has not been possible to duplicate analyses except when anchored at important points. In our later work we have felt it more important to make long stops, and rapid runs between points of no special interest, rather than to take mile samples throughout the course of a river's flow. For instance, by stopping for ten days at any point above or below a city it is possible to gather a mass of data, which, for a period at least, represents river conditions rather accurately. A single analysis would not do this, for, as I have indicated, the disturbing factors are too great and are too constantly present to warrant any special importance being placed upon the results.

Bacterial studies carried on for a period give good average figures where a single count might be so high as to throw doubt, or so low as to give rise to undue confidence. Bacterial analyses taken throughout the course of

an extensive survey, even when determined in the routine of a day's work on samples collected at definite intervals of time and river flow, have definite value, at least when studied as a whole and not as individual counts.

In the light of our experience we have reached a conclusion, not yet definite, but nevertheless strongly grounded, that the only analyses of real moment, that is, the factors which should be taken on every sample and repeated every mile, are the oxygen consumed and dissolved oxygen, supplemented by a bacterial count, and the determination of the presence or absence of the colon bacillus. Occasional determinations of chlorine, nitrates, nitrites, alkalinity, free and albuminoid ammonia, are of just as great value in reaching final conclusions as a note book full of data subject to all of the errors and fluctuations to which I have referred.

In the analysis of isolated laboratory samples, which it is not possible to secure in duplicate, and which are usually sent in by some ten o'clock health officer who awakes to his duty only after typhoid has developed in the family, the routine water analysis so long employed and rigidly adhered to, can not be dispensed with. I hope it may be improved. I see no reason why the chemists of today can not improve over the methods of years ago just as they have improved analytical methods in all other lines of laboratory work. But I am strongly convinced that in routine work such as that involved in the study of stream conditions, in the character of a water supply, in the operation of a filtration plant, much of the work now being done may be omitted without in the least depreciating the value of the surveys or diminishing the sum of the evidence obtained.

THE ALASKAN ESKIMO.

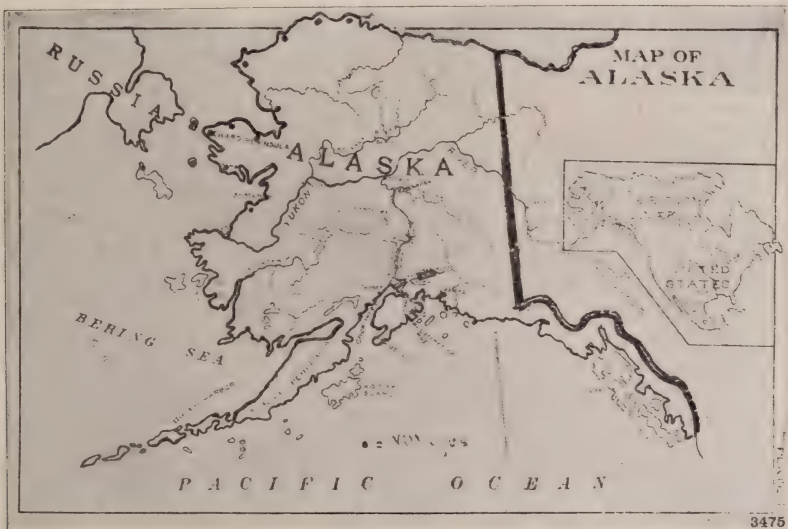
THE PREVALENCE OF DISEASE AND THE SANITARY CONDITIONS OF THE VILLAGES ALONG THE ARCTIC COAST.

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During the Arctic cruise of the U. S. S. *Bear* in 1913-1914 the writer, attached as medical officer to that ship, had the opportunity of visiting the Eskimo villages along the Arctic Coast and those on St. Lawrence, King, and Diomed Islands in the North Bering Sea. In rendering medical aid to these people, the opportunity to observe the diseases from which they suffer and to note the conditions under which they live presented itself.

The villages spoken of in this article are shown on the map here reproduced. In all there are fourteen, having a total population of about 2,200. Accounts of early explorers refer to these people as being healthy and robust



with little or no disease among them. Data collected by others has shown that those Eskimos living in isolated sections and coming into contact with the white man very little, if at all, are also free from disease to a very great extent. Today disease is always found to be more prevalent among those natives living near mining camps, whaling stations and trading posts, in spite of the fact that in these communities they will receive more and better medical attention. There seems little doubt that contagious diseases, with which these people are afflicted, were introduced by Europeans and Americans. Probably the first to mingle with the Eskimo were explorers,

then the whalers, traders, gold seekers and of more importance, that class of people that follow in the wake of such adventurers.

The Eskimos, like other aboriginal people, are peculiarly susceptible to the diseases of civilization, especially those we call children's diseases, and epidemics of these diseases have raged with disastrous results in several communities. In addition, the habits, customs and mode of living of these people are favorable to the spread of disease once it has been introduced.

The Eskimo, of course, is entirely ignorant of the modern conception of disease, its cause or treatment. He still clings to the old tribal traditions and customs in alleviating the sick and the prevention of disease. Each community has its "doctor" who, holding the natives through their natural superstition, continues to practice his "supernatural" powers. As an example, a native of King Island told me, through an interpreter, that the "doctor" in his village had completely relieved a severe pain in his chest by cutting his heart out, cleansing it and then replacing that organ. To substantiate his story he showed me a small linear scar about one inch in length just below the costal border involving the skin only. These practitioners probably have some hypnotic ability and a representative of the Smithsonian Institute who spent some time among these people informed me that he had observed such a performance.



Point Hope.

The Eskimo dwelling has a very important bearing on the health of these people. They are small, low-roofed, and, generally, part underground. The walls are thick and made principally of driftwood, earth, and stones. Ventilation is generally poor, though in some, if well cared for, it is satisfactory, being obtained by means of a hole in the roof and by the entrance. The floors are generally earth and are covered with skins. The sleeping quarters are sometimes partitioned off by a curtain made of the skins of different animals, though all the occupants sleep in a common bed. The dwelling is heated with a blubber or oil lamp, the smoke from which is very disagreeable and objectionable. This type is that used in general by the Eskimo, though different villages have their particular type of entrance.

Some enter by a small door; others have the entrance from the roof, entering by means of a ladder a small compartment which leads to the dwelling proper by a long low passageway. Two villages, those of King Island and St. Lawrence Island, have a type of dwelling entirely different from others and built to meet the particular needs in that location. Regardless of the type, they are all, as a rule, overcrowded, poorly ventilated and insanitary living quarters. The ordinary type of dwelling cannot be occupied the year around as with the thaw in the spring the walls drip, water collects on the floor and, fortunately for the native, he is forced to live an outdoor life for at least three months of the year. These he spends in a tent and the insanitary conditions of the winter house are temporarily avoided. The existence of any contagious or infectious disease in such living quarters renders the prognosis bad and the probability of transmission is increased.

The occupants sleep in a common bed and eat from a common pot as a rule. Meat, seal oil, blubber, often in a poor state of preservation; fur garments, hides and skins litter the room. Skins tanned by the native process are immersed for some time in urine and this is collected from time to time and stored in the house. Toilet articles are unknown except to a few who have come under the influence of a missionary or school teacher. Bathing is, as far as I could ascertain, a custom not yet adopted.



A Typical Eskimo Igloo.

Filth, waste and garbage is deposited where most convenient. In the summer, pools of water are the favorite dumping places. Skins, meat and fish are hung on large frames throughout the village. In some villages deep pits are dug into which great quantities of meat are thrown and stored for future use, the natives claiming that partial decomposition improves the flavor. The water supply, snow and ice during the winter and running streams or shallow wells during the summer, were invariably polluted with filth, waste, garbage, and in some instances, meat in various stages of decomposition was observed immersed undergoing the native process of curing.

The Eskimo has thrived for generations upon a diet composed of meat, oil and blubber. Of late years, with the coming of the white man, other

food supplies have been introduced, though most of the natives do not know how to properly prepare this food. The reindeer which were imported from certain parts of Russia for the Eskimos have been of great benefit, the skins being used for clothing and the meat for food. A certain percentage of these animals have, however, been found to be infected with the cyst of the *T. echinococcus*, and dogs which are so numerous and with which the natives live in intimate contact, have been found to harbor the adult stage of this parasite.

The disposition of the dead is governed entirely by local tribal traditions and customs. The bodies are sometimes placed in a crevice and stones thrown upon it, or buried partially underground. These customs have of late been altered with the coming of the missionary and they are interred in the same manner as in this country.



Interior of a native house showing skin curtain partitioning off the sleeping room and how furs, skins, etc., litter the room.

The portion of Alaska in which these people live is away from the ordinarily traveled routes. From a navigator's view it is dangerous cruising. The charts are poor, harbors few, and landings are made with difficulty. In addition the sea is free from ice only a small part of the year. Under such conditions it was impossible to make a routine examination of the natives. The table below, however, shows the diseases which were met and I think are representative on a whole of the state of health of these people. The death-rate during the year 1913 was 31 per 1000, and the birth-rate 45 per 1000, this being computed from data furnished by the Department of Education, and while not being absolutely accurate, gives a fairly close estimate on the status of these people.

Of the 281 cases to which medical relief was afforded, there were:

DISEASES OF THE EYE:

Interstitial keratitis,	20
Blepharitis, with ulceration, ectropion and trichiasis.	30
Conjunctivitis (all varieties)	10
Blindness, traumatic.	3
Blindness, snow.	2
Eczema of lids.	1
Ophthalmia.	2
Strabismus.	1
Cataract.	7
Pterygium.	10
Atrophy of optic nerve,	1
Iritis.	2
Stricture of lachrymal duct,	2
Corneal fistula.	1
Chemosis.	1
Congenital malformation of lids.	1
Trachoma (?)	1

95

DISEASES OF RESPIRATORY TRACT:

Tuberculosis of the lung.	24
Acute bronchitis.	16
Acute pleurisy.	2
Pneumonia.	2

44

VENEREAL DISEASES:

Syphilis.	6
Gonorrhœa.	1

7

TUBERCULOSIS:

Lungs.	24
Bones.	11
Joints.	10
Glands.	8
Skin.	1
General.	1

55

GYNECOLOGICAL:

Disordered menstruation.	3
Abortion.	1
Laceration of perineum.	2
Ovaritis.	1

7

DISEASES OF THE NERVOUS SYSTEM

Hemiplegia.	2
Paraplegia.	1

3

CONGENITAL DEFECTS:

Cleft lip and palate.....	2
Umbilical hernia.....	1
Malformation of the eyelids.....	1
Dwarf—malformed limbs.....	1
	<hr/> 5

MUSCULAR SYSTEM:

Rheumatism.....	12
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DISEASES OF THE JOINTS:

Tuberculosis.....	10
Rheumatism.....	5
Chronic dislocation.....	1
	<hr/> 16

DISEASES OF THE SKIN:

Tuberculosis.....	1
Favus.....	1
Impetigo Contagiosa.....	26
	<hr/> 28

ABNORMAL GROWTHS:

Epithelioma of the penis.....	1
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DISEASES OF THE CIRCULATORY SYSTEM:

Valvular disease of the heart.....	1
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DISEASES OF THE GASTRO-INTESTINAL TRACT:

Chronic gastritis.....	10
Acute gastritis.....	8
Ptomaine poisoning.....	5
Prolapse of the anus.....	1
Enterocolitis.....	12
Malnutrition (infants).....	5
	<hr/> 41

U. S. R. C. *Bear* in Arctic Ice, August, 1913.

RELATION OF PUBLIC HEALTH TO RACE DEGENERACY.

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Battle Creek, Michigan.

Read before the General Sessions, American Public Health Association, Colorado Springs, September, 1913.

The service which has been rendered the human race by the public health movement of the last half century is the noblest example afforded by human history of successful, philanthropic, human activity. Within the last fifty years the average length of life in this country has been increased about seven years. In Europe, the increase has been considerably greater. It is safe to say that public sanitation has within recent years added to the lives of the present inhabitants of the civilized portion of the globe not less than four billion years of human life. Using Finkelberg's estimates and others we may conclude that human life is at the present time being increased at the rate of sixteen or seventeen years per century and that the rate of increase is increasing, having gradually moved up from four in the seventeenth and eighteenth centuries to nine in the first part of the nineteenth and nearly double this rate in the last half of the century.

This marvelous beneficence, the proportions of which far exceed those of any other boon conferred by science upon humanity, has resulted from a prolonged succession of triumphs achieved by man in recent times, in his age-long battle against the enemies of life and health. What these battles were and how they were won it is quite unnecessary to recount in the presence of an audience so familiar as is this with all the details of modern sanitary progress. The chief purpose of this paper is to call attention to the remarkable fact that, notwithstanding the enormous saving of human life which has occurred in modern times and the doubling of the average length of life within two centuries, there has been going on at the same time a remarkable depreciation in racial vitality and stamina.

That the human race, or at least the civilized portion of it, is degenerating at a rapid rate, has been strongly suspected for a long period of time. Numerous writers within the last fifty years have called attention to the evidence of race deterioration and a few years ago the British government appointed a commission, known as the British Interdepartmental Committee on Physical Deterioration in Great Britain, which was charged with the study of investigating this question in the British Isles. The committee conducted a careful inquiry extending through several years, in the course of which testimony was taken from all classes of persons likely to be able to throw any light upon the subject, particularly physicians, sociologists, magistrates, scientists, clergymen and military officers.

The voluminous report published by the committee presents a large number of facts of great significance, many of which indicate that race degeneration is actually taking place in Great Britain. It is stated, for example, on page 177 of the Report, that in Manchester and other manufacturing districts, evidences of degeneration are very marked. There is a distinct depreciation of stature. In Manchester and Salford it has been found necessary to import men from the country to act as policemen, as a sufficient number of men large enough to serve in this capacity cannot be found in the districts named.

An army recruiting officer testified that 60 per cent. of the young men offering themselves for military duty were rejected on account of physical unfitness, and this notwithstanding the fact that the standard for admission to the army has been reduced within the last sixty years from five feet six inches to five feet. In the examinations for admission to the army, it was found that out of every thousand applicants, nearly six hundred fell below the old standard, and more than half had a chest measurement of less than thirty-four inches, the minimum standard of forty years ago. It was found also that, notwithstanding the great reduction in the height standard, the proportion of persons rejected because they were too short was not decreased.

Statistics gathered by the British Association for the Advancement of Science show a decrease of one inch in the height of adult men in the last quarter of the last century. Many persons who testified before the Interdepartmental Committee presented evidence of physical deterioration among the English people in various directions.

Professor Rubner, in an address before the late International Congress on Hygiene held at Washington, D. C., intimated his belief that the human race is deteriorating, and suggested that a given number of people, five or ten thousand for example, would be found to weigh less in the aggregate at the present time than the same number of people weighed a generation ago.

Within a few months, Doctor Tredgold, an English authority of high repute, medical expert of the Royal Committee on the Feeble-Minded, and well known for his studies in eugenics, recently contributed an article to the *Quarterly Review* in which he presented most conclusive evidence of a distinct "decline in the vitality of the English people and growing sickness." Professor Tredgold calls attention to a fact which has apparently been generally ignored by sanitarians, viz., that average longevity is not a correct measure of race vigor. Says Tredgold: "It would be extremely fallacious to conclude that a diminished death-rate is any indication of an increased power of resistance to disease and an improvement in the inherent vitality of a race."

For more than thirty-five years the writer has maintained the same proposition, insisting that a high degree of race vigor is indicated by the attainment of great age by a large proportion of the members of a community rather than by a high average longevity.

Statistics gathered by Tredgold from various friendly societies, aggregating a membership of nearly a million and a half, demonstrate that, notwithstanding the great advance in the prevention of disease through public sanitation and improvements in therapeutics, the average amount of sickness at all ages, has steadily increased during the last half century. The following table taken from the report of actuaries, appointed in connection with the National Insurance Act recently enacted by the British Government in 1911, shows the increase of sickness which has occurred during the last thirty years in several large friendly societies:

SICKNESS PER ANNUM PER MEMBER IN WEEKS

(Male lives)

Taken from the Report of the Actuaries Appointed in Connection With the National Insurance Act of 1911.

Ages.	Manchester Unity 1866-70.	Manchester Unity 1893-97.	Ancient Order of Foresters 1871-75.	Friendly Societies. 1876-80.
16-19.....	.54 (78%)	.92	1.04	.88
20-24.....	.75 (20%)	.90	.82	.85
25-29.....	.81 (17%)	.95	.85	.87
30-34.....	.93 (14%)	1.06	.97	1.02
35-39.....	1.06 (20%)	1.27	1.15	1.24
40-44.....	1.26 (25%)	1.58	1.37	1.47
45-49.....	1.64 (21%)	1.99	1.71	1.89
50-54.....	2.22 (24%)	2.75	2.27	2.39
55-59.....	3.05 (31%)	4.02	3.21	3.36
60-64.....	4.72 (34%)	6.31	4.58	5.17
65-69.....	7.24 (46%)	10.59	7.97	8.73

A study of this table shows a very marked increase of sickness at all ages of life, from sixteen to seventy years, ranging from 14 per cent. to 70 per cent. the greatest increase being at 16-19 years and the next greatest 55-69 years.

Tredgold also shows that the decline of the death-rate in England has been confined to ages under fifty. Rittenhouse, Fisk, and others who have made studies of this subject from the best statistics obtainable in this country, have shown that within the last thirty years there has been

a very pronounced decrease in the life expectancy of men over forty to forty-five years of age.

The report of the United States Census Bureau is a mine of most interesting and valuable information on this subject. A study of these reports brings out the important fact that the notable increase in the average longevity, which has occurred within the last two or three centuries, is solely the result of the suppression of acute maladies in infants and adults. This is clearly shown by the fact that right along with the decrease in acute maladies of various sorts, there has been a steady increase in the mortality rate of most chronic maladies.

It is apparent then that while public sanitation has accomplished work of inestimable value in certain directions, it has not as yet accomplished all that could be desired. It may be profitable to consider some of the things which public sanitation has failed to accomplish.

1. While lessening the mortality rate of acute diseases, almost without exception, public sanitation has utterly failed to lessen the mortality from chronic diseases. Chronic maladies and degenerations of all sorts are clearly shown by each annual report of the Census Bureau to be increasing and not at a slow and uncertain rate, but at a surprisingly rapid rate. For example, within the last ten years the mortality from heart disease has increased over 50 per cent.; the mortality from arteriosclerosis has increased from 6.1 per thousand in 1900, to 21 in 1911, an increase of nearly 250 per cent. According to the Census report, nearly four times as many people die from disease of the blood vessels today as a dozen years ago. Doubtless this showing of the Census Bureau is in some part the result of increased accuracy of diagnosis and increased attention given to blood pressure and the diseased conditions of blood vessels in recent times.

The mortality from Bright's disease in the United States has increased 151 per cent. within the last thirty years, as shown by Rittenhouse. The mortality rate from diabetes, in spite of great improvements in the treatment of this disease, has in the last dozen years increased 50 per cent. The mortality from appendicitis and acute maladies chiefly dependent upon chronic infection of the colon, in spite of the great number saved by surgical intervention, has increased more than 20 per cent. in a dozen years.

Mr. Rittenhouse, the able expert of the Equitable Life Insurance Company, has shown that the mortality from chronic disease in general has doubled within thirty years. When we consider the fact that chronic disease kills half the people who die, or about seven hundred and fifty thousand people annually, it is evident that public sanitation and the efforts of health boards, and federal, state and municipal health authorities and agencies connected with public health administration, have made no progress in controlling those causes of mortality which are respon-

sible for half the deaths which annually occur in this and other civilized countries.

The significance of this failure appears when we consider that half the deaths from chronic disease which occurred last year, for example, would not have occurred if the people of the United States were as healthy as they were thirty years ago. That is, that the causes of chronic disease, whatever they are, have increased or multiplied to such an extent within the last thirty years that we are losing not less than three hundred and seventy-five thousand persons in this country alone each year from causes which are certainly preventable since they either did not exist or were only half as active thirty years ago as at the present time.

Is it not the duty of state and national boards of health and of all health authorities to undertake to combat this rising tide of mortality from chronic disease and to save some of the four millions who, at the present rate, are certain to die unnecessarily from these causes within the next decade? Is it not just as much within the province of a board of health to endeavor to ascertain and to suppress the causes of Bright's disease, diabetes, arteriosclerosis, cancer, pernicious anemia, heart disease, hepatic sclerosis and other chronic maladies as to seek to control yellow fever, typhoid, small pox, diphtheria and other infectious maladies? The increasing death rate of cancer, diabetes, Bright's disease and other chronic maladies is most alarming evidence of a decline of race stamina and calls for a vigorous effort to stem this tide of degeneracy.

TABLE SHOWING INCREASES AND DECREASES IN LIFE EXPECTANCY
BETWEEN 1880 AND 1910. (RITTENHOUSE)

Ages.	Death-rate, 1880.	Death-rate, 1910.	Decrease and increase in rate.	Per cent. of same.
All.....	17.63	15.80	-1.83	-10.38
Under 30.....	16.3	11.3	-5.0	-30.6
30-34.....	9.12	6.99	-2.13	-23.3
35-39.....	10.1	8.90	-1.20	-11.8
40-44.....	10.20	10.95	+ .75	+7.35 (5)
45-49.....	12.20	13.79	+1.59	+13.0
50-54.....	13.70	18.35	+4.65	+33.9
55-59.....	20.49	24.28	+3.79	+18.5
60-64.....	25.69	34.85	+9.16	+35.6
65-69.....	40.5	53.16	+12.66	+31.2
70-74.....	55.4	75.96	+20.56	+37.1
75 and over.....	123.68	143.66	+19.98	+16.1
Above 40.....	25.10	30.42	+5.32	+21.20
Above 50.....	35.24	44.07	+8.83	+25.06
Above 60.....	53.81	67.73	+13.92	+25.87

2. While the death-rate has been increasing, there has been a simultaneous decrease in the birth-rate. In several civilized countries, the birth-rate is decreasing more rapidly than the mortality rate. In France, the birth-rate has actually fallen below the death-rate, so that the native population is actually dying out. In England, within recent years, the birth-rate has decreased so rapidly that it has now almost reached the death-rate, so that the population of Great Britain will soon be stationary. The birth-rate is rapidly declining in almost every civilized country of the globe as shown by the following table:

DECREASE OF BIRTH-RATE BETWEEN 1880 AND 1902.

Countries Showing a Decreased Fertility Rate.	
<i>Country.</i>	<i>Decrease per cent.</i>
New South Wales.....	30.6
South Australia.....	28.0
New Zealand.....	24.5
Victoria.....	24.2
Western Australia.....	23.9
Queensland.....	23.2
United States (estimated).....	20.0
Belgium.....	19.8
France.....	10.7*
England and Wales.....	17.7
Scotland.....	12.7
Denmark.....	9.8
The Netherlands.....	9.5
German Empire.....	8.4
Sweden.....	8.2
Switzerland.....	6.4
Norway.....	3.7
Italy.....	2.5

The registrar-general of Great Britain states in his annual report for 1907, "At the last census period, the fertility of English wives was lower than recorded in any European country except France." A reference to the above table will show, however, that in the United States the birth-rate is diminishing more rapidly than in any other part of the world, with the exception of Australia and New Zealand. The fact appears that the fertility of American wives is decreasing at the rate of 10 per cent. a year. If this decline in the birth-rate is due to physiological incompetence it is a direct symptom of racial decay. If it is voluntary it is an indirect sign of racial decay to the extent at least that those fit for motherhood shirk its responsibilities and so fail to contribute their quota of vitality to the next generation. In my opinion the decline is chiefly due to the former cause.

An eminent member of the Royal College of Surgeons testified, before the English Committee on Physical Deterioration in Great Britain, that sterility was unquestionably increasing among the English and cited this as an evidence that race deterioration was taking place.

Closely akin to this growing loss of fertility in women is the rapidly increasing inability of women to nurse their infants. According to Holt, "In New York, at least three children out of every four born into the homes

of well-to-do classes must be fed at some other fount than the maternal breast." A professor of entomology, of the University of California, finds an analogy between the human race and bees, ants and some other insects. He insists that the increasing number of women who have lost both the instinct and the capacity for motherhood is evidence that there is developing in the human race a neuter type corresponding to the worker class among bees and ants. In certain parts of the United States the decay of the native population as shown by diminished fertility is far advanced. For example, among native-born New England wives the average number of children is only 2.7, while foreign-born wives living in the same communities have an average of 4.4 children.

In the decrease of the birth-rate and the increase of incompetent mothers, we are face to face with a race disease which must inevitably end in what Mr. Roosevelt termed "race suicide," and is unmistakable evidence of race degeneracy. What have national, state or municipal health authorities done toward investigating the causes of this unmistakable and growing evil which threatens disaster to the race?

3. State boards of charities and special commissions have, within the last forty years, so greatly improved the conditions under which the insane and other mental defectives are cared for that the death-rate of certain of these unfortunate classes has actually fallen below that of the general community. At the same time, nothing has been done to check the development of these defectives and so they are increasing in proportion to the sound part of the population. Mental defectives have increased within the last fifty years at the rate of 900 per cent. in a century. That is, at the present rate of increase, in one hundred years from the present time, 9 per cent. of the total population will be insane, idiotic or imbecile. According to Doctor Davenport, mental defectives now constitute 1 per cent. of the total population. The recognition of a new class of mental defectives, the moron, gives us the key to a large number of social problems and explains the rapid increase of a certain type of criminals and the growing army of ne'er-do-wells. Of all classes of mental defectives this class is by far the most dangerous because not easily recognized except by experts, and so left to reproduce and increase without restriction.

A careful study of the situation in New Jersey, conducted under the supervision of Dr. C. B. Davenport, a few years ago, suggests the estimate that the feeble-minded class has doubled in that state within a single generation. Mental defectives are increasing in some countries and certain parts of this country at a most alarming rate. For example, the population of England and Wales has nearly doubled since 1860, while the number of insane has increased from 36,000 to 130,000. In France, the insane population has increased more than ten times as rapidly as the sane. In Prussia, the population has increased in thirty years less than 50 per

cent., while insanity has increased from 20,000 to 98,000 or nearly 400 per cent.

An eminent English alienist recently made the assertion that the whole human race will in time become insane. The writer does not share this pessimistic view for, notwithstanding the fact that at the rate at which mental defectives are at present increasing, the whole race would become insane, idiotic or imbecile within less than three centuries, so sad a calamity is not likely to befall the human family, for long before the race reaches the state of universal incompetency, the impending danger will be appreciated, the cause sought for and eliminated, and, through eugenics and euthenics, the mental soundness of the race will be saved. Is it not high time, however, that every state board of health and every other health official became enlisted in an effort to erase and eradicate this blot upon the brain which is so rapidly over-shadowing the race?

4. One of the most remarkable achievements of public sanitation is the reduction of infant mortality, but a study of vital statistics shows that the reduction in death-rate of infants is chiefly due to the improvement of public milk supplies and a spread of knowledge of the care of infants. Tredgold shows from the returns of the registrar-general of England that the number of infants that die from "innate defects of constitution" in each 1,000 children born is quite as great as fifty years ago, and this notwithstanding the fact that the total death-rate of infants has been reduced one-third.

When we add to this the fact that a great number of feeble infants that formerly died soon after birth, lacking vitality to live under existing conditions, are now kept alive by scientific feeding and intelligent care, it becomes evident that the proportion of feeble infants and weakling adults must be steadily increasing. It is evident that there is a growing blight on the baby crop. If the same situation existed in relation to the corn crop or the pig crop, federal and state authorities would give themselves no rest until the cause was found and removed. A large number of these weaklings live to reproduce their kind.

Here is another indubitable evidence of race degeneration and a field open for thorough-going research and earnest work on the part of health authorities everywhere.

5. As a natural consequence of the increased number of defective babies, we have a growing army of defective children. Our schools are filled with defectives of various classes. According to Doctor Wood of Columbia College, New York, a nation-wide investigation of the children in the public schools of both city and rural districts shows that of the 20,000,000 children in the public schools at present:

1,000,000 have flat foot, spinal curvature, or other deformities sufficiently grave to interfere with health.

1,000,000 have defective hearing.

5,000,000 have defective vision.

6,000,000 suffer from malnutrition.

10,000,000 have defective teeth.

6,000,000 have adenoids, enlarged tonsils or cervical glands needing attention.

15,000,000 children, or three fourths of the whole school population, have physical defects sufficiently grave to require attention and to seriously threaten health, usefulness and even life in later years.

What would a farmer think of a flock of sheep in which three fourths of the lambs were defective, or a herd of cattle three fourths of which showed deformities, decayed teeth or other unsoundness?

We have improved our horses and cattle till they are the finest that the sun ever shone upon. We have improved our dairy cattle until their capacity for producing milk and butter is almost beyond belief. We have improved our hens and our hogs to an amazing extent. Man has improved every creature he has redeemed from the forest and the plain with the exception of himself. Himself he has neglected until race degeneracy has become a certainty, and race extinction a possibility.

Should those who are the official custodians of the health of the people sit quietly by and see this process of race destruction going steadily on? Should not the work of boards of health include the work of discovering and eradicating the causes which are blighting the vitality and vigor of the race in the early years of life?

While the average length of life has been increasing in all civilized countries within the last three centuries, the proportion of centenarians to the total population has been diminishing. At the present time the most highly civilized nations have the smallest number of centenarians, while the largest number is found among those people who still adhere most closely to the simple life. The Bulgarians, a people numbering only five million, boast of 3,000 centenarians, or one in 1,700. In Spain, the proportion is one to 40,000; in France, one to 190,000; in England, one to 200,000; in Germany, one in 700,000. We have in this country one centenarian to every 25,000 of the population, but the number is rapidly decreasing as the natural result of the increased death-rate after middle life, due to the increasing mortality from chronic disease.

Centenarianism is rapidly going out of fashion. The rapid decrease of the proportion of persons of advanced age in all civilized lands is a certain indication of racial decay. The human race may be likened to a tree which is dying at the top. Why should not boards and departments of health, state and national, make it a very essential part of their work to inquire into the nature and causes of the maladies which are destroying the capacity of men and women to live out the normal span of human life?

Public health work has not only failed to prevent race degeneracy, it has actually tended in some ways to accelerate the rate of decay. Acute maladies and adverse conditions of life are a natural means of weeding out weaklings and securing the survival of the fittest. Public health work, through quarantine, protection of water supplies, and improving the general environment of human life, has in a large measure set aside this great biological law. It is no longer the fittest alone that survives, but also the feeble individual who is afforded sufficient protection. The preservation of these weak and unfit individuals decreases the average death rate, but at the same time decreases the average stamina of the race. Through heredity, weak strains are established which must corrupt and depreciate the stronger ones more and more from one generation to another.

Public health work must then inevitably tend to race depreciation, unless it concerns itself with the improvement of the weaklings which it preserves, and with the prevention of the propagation of incurable defects.

As regards the question, what can boards of health and public health officials do to check these evil tendencies which threaten the existence of the race, I am not prepared to lay down a complete program. This would involve far more wisdom and experience than I possess, and perhaps more than the world possesses at the present time. I venture to offer a few suggestions of things that need to be done to check race degeneracy and to make for race betterment.

1. First of all, there ought to be set on foot a nation-wide movement to secure trained and cultivated men for every position involving the responsibility of health administration. The present situation is absolutely intolerable. The health of men and women in the United States receives far less attention and consideration than does the health of swine, poultry and other domestic animals. The men charged with the custody of the public health, especially in small towns and rural districts, are, in many instances, far less well qualified for their tasks than those who have supervision over live stock.

2. There should be such thorough-going coöperation between boards of health or health officials and boards of education that every school and every pupil attending every school may have the full benefit of the latest and the best knowledge with reference to health preservation.

3. A campaign of education should be pushed so vigorously that every man, woman and child in the whole United States may be in the shortest space of time made acquainted with the general principles of eugenics and right living by means of moving picture exhibitions, educational plays, and the methods and effects of food contamination and adulteration should be graphically displayed. Up-to-date methods of dairying, the care of foods in the market, the store and the home, wholesome methods in the preparation of foods and all that pertains to nutrition should be

made clear to the simplest mind by moving pictures and other means. The evil effects of alcohol, syphilis, opium and other drugs, the deforming effects of wrong habits in sitting, and other careless habits should be impressed upon the popular mind by popular demonstration and exhibitions, together with the effects of good habits, of the out-of-door life, of healthful sports, etc. Every community and every public school should be supplied with swimming pools, playgrounds, out-door gymnasiums, and other out-door study places, all of which should be under the supervision of trained directors.

The public will never supply these health advantages for children until made by education to appreciate the relation of a right environment and a natural life to vigor and efficiency. Through health conventions, health schools, parents' classes and various other means, this educational campaign may be carried on. The school nurse may not only inspect and care for children, but also visit the children's homes and thus become acquainted with their home conditions, improving the opportunity to give instruction to the parents.

We possess knowledge enough of eugenics and eugenics to create a new race within a century, if the known principles of healthful living and scientific breeding were put into actual practice.

We know that tuberculosis is a house disease. We are able to cure half of the cases of early lung tuberculosis by turning them out of doors. These facts have been known for many years, but still we continue to lose 150,000 lives annually from tuberculosis, and are developing a consumptive variety of man which already numbers several millions of narrow-chested, low-resistant individuals, destined to die early and through heredity, a constant menace to the welfare of the race. The white plague will never be controlled until we convince the average citizen of the necessity of breathing out-of-door air day and night, and of living in the open as much as possible and thus building his natural resistance to disease. Building laws should require provision in tenement houses and private residences of sleeping porches or other out-of-door sleeping arrangements. We are still troglodytes, and will degenerate and disappear like the cave dwellers of the remote past unless we return to the open air, our natural environment.

We know that alcohol is responsible for a very large proportion of the unfortunates who fill our asylums for the insane and the feeble-minded, and that its degenerative effects are hereditary. Should we not take an active interest in combating this well-recognized foe of the race in every legitimate way.

We are only too familiar with the appalling effects of syphilitic and gonorrheal infections upon the individual and upon the race; yet we leave the public in ignorance of the terrible facts which we possess, and have

made almost no effort to restrict infection by methods which have been found effective in controlling the spread of other infectious maladies. Our duty as custodians of the public health certainly requires that we should advise some means of registering and quarantining every discovered case of venereal disease and of preventing the extension of these vice diseases to the innocent through marriage and heredity.

Chittenden, Fisher, Folin, and others have shown the danger of an excess of protein and the advantages of a low protein diet. The farmers of Iowa and Minnesota and the agriculturists of Denmark have long made use of this principle in the feeding of swine and other domestic animals with most striking results. A few intelligent people have likewise profited by Professor Chittenden's discovery which, if generally put in practice, would unquestionably lessen the death rate 10 per cent. or more and would lessen the cost of living at least twice as much. The general public are still in bondage to exploded errors respecting human feeding, although the high and increasing cost of meat products promises to help along a much-needed diet reform.

Sherman, of Columbia, estimates that half of the people of the United States are suffering from lime starvation through the use of fine flour bread and an excess of meat and cane sugar, which contain practically no lime, while whole wheat contains four grains of lime to the pound, peas and beans 8 grains, and milk 16 grains. It is no wonder that three fourths of the school children have seriously defective teeth and other skeletal defects. The tooth brush will not stop the development of an edentulous race. Scientific feeding is the essential thing, and the people must be made acquainted with the fact.

Bunge and Hindhede have shown the evils of a meat and cereal diet through the preponderance of acids in these foods and have demonstrated the essential value of the alkaline salts found in fruits and green vegetables, and especially the potato—a food which, for other reasons pointed out by Rubner, is far better suited to be made a staple diet than is maize and most other cereals.

Combe and later investigators have shown the essential rôle played in nutrition by the vitamins of fresh foods which are largely or even wholly destroyed by cooking at high temperatures and hence the danger of feeding infants exclusively on sterilized milk, and adults on an exclusive diet of cooked foods. Our primitive ancestors were ignorant of the art of cookery. The necessity for food in the state in which nature provides it for our use still exists in the constitution of the race and it cannot be safely ignored. Conditions allied to scurvy are widely prevalent, and scurvy, itself, not infrequent, as the result of popular ignorance of this important biologic fact.

Cancer kills 75,000 persons in this country annually, one in twenty

of all who die, and tortures three hundred thousand victims all the time. One seventh of all women and one twelfth of all men over forty perish from this horrible malady. William has shown that cancer is confined to the civilized races of men and to domestic animals and especially high protein feeders. Cats and dogs are more subject to cancer than are human beings. Horses, sheep, bovines, and even swine are rarely affected.

Senn showed that appendicitis is unknown among the low protein feeders of Central Africa, and Lucas-Championier noted its rareness among the Arabs of Algiers and the inmates of asylums and prisons in France who have a low protein diet.

Huchard and other investigators have pointed out the influence of chronic poisoning due to errors in diet and drug habits in producing arteriosclerosis, a rapidly growing scourge in all civilized countries.

Metchnikoff of the Pasteur Institute, and Arbuthnot Lane, an eminent London surgeon, have demonstrated the destructive role played by colon poisons as the leading cause of chronic disease. Metchnikoff finds the remedy in changing the intestinal flora by feeding friendly germs in buttermilk or otherwise; Lane removes the colon; but Tissier, a colleague of Metchnikoff in the Pasteur Institute, and the real originator of the friendly germ idea, suggests the more rational remedy, the adoption of a low protein diet, largely excluding animal proteins. That this may be safely done is now admitted by all physiologists.

Why should not the people be made acquainted with these and other facts which profoundly influence their physical life? Why should we wait for the slow diffusion of life-saving knowledge through desultory efforts and private initiative while more millions perish for lack of knowledge.

Why should we not have in every state, under scientific direction, experiment stations for the practical testing and demonstrating of the principles and methods of living evolved by scientific research or human experience instead of leaving the public to be misled by faddists or ignorant enthusiasts, or to invite and cultivate disease and degeneracy by habits born of the ignorance and superstition of the past?

Is not a legitimate and important part of the function of public health officials to collate the results of scientific research which bear upon personal as well as community health and to place these facts before the public in such ways as to command attention and to stimulate in every community the development of a sentiment of respect for the body as man's choicest possession and an ambition to preserve its integrity and to increase its powers not only for personal advantage in happiness and efficiency, but for the sake of generations to come and thus for the preservation and improvement of the race?

Acute diseases may be controlled by quarantine and public sanitation but chronic diseases are a home product. They are almost altogether

the result of vicious habits of living, departures from the normal conditions to which the human constitution is adapted, hence men and women everywhere must be instructed in the principles of eugenics and euthenics. Those who have had the good fortune to be well born should be instructed to live in such a way as to maintain intact their splendid heritage and pass it on to the next generation undeteriorated.

Movements of all sorts which seek to promote physical welfare should be encouraged and unified. Eugenics and euthenics should be magnified before the people until their paramount importance is appreciated and legislatures become willing to appropriate funds as liberally for these essential means of race betterment as they are now doing for the improvement of crops and farm animals through similar means.

Prizes should be offered for the finest families and the best health and endurance records.

Through state life insurance, the whole population should be brought under government medical supervision. By periodical examinations, the early beginnings of chronic diseases should be detected and thus arrested by timely instruction in regard to necessary changes in habits or occupations, and every such case should be made an object lesson by means of which relatives and friends should be influenced to adopt preventive measures in time to avoid the same maladies.

The new science of eugenics founded by Galton, supplemented by what has been called the science of euthenics, when they come to be comprehended and put into practical operation, will result in the creation of an aristocracy of health, in the development of a new race of men. Should not every board of health and official health agency be actively engaged in the battle against disease and degeneracy, in all its forms, chronic as well as acute? Why should this work be left to private initiative? Nothing could be more profitable to the state and nothing more prolific of satisfying results to those engaged in the effort than a thorough-going campaign for race betterment through sane living combined with scientific sanitation.

The establishment of a national department of health will provide a central bureau by which to unify the work and collate its results. Professor Fisher estimates that the application of present knowledge of hygiene ought to increase the average of human life at least fifteen years. Think what it would mean to the nations, to the world, if the average man lived 60 years instead of dying at 45. The addition to a single generation of one billion five hundred million years of life in this great and glorious country of ours is a goal well worth working for. It appears improbable, however, that such a desirable result can be reached by public sanitation alone. The increasing death-rate, after forty years, chiefly due to unphysiologic personal habits, will soon neutralize the effect of public sanitation, which has already nearly finished its greatest tasks, and can hardly

hope to exert in the future so marked an influence in life extension as in the recent past.

What is now necessary is that the individual man as well as the community and the domicile, shall be brought in harmony with the great biologic laws which govern human life.

What the world needs at the present time more than anything else is race improvement. If race degeneracy is to be arrested, it will only be accomplished by the development of a more resistant and better type of men—a tougher, more enduring man more capable of wrestling successfully with the problems of the twentieth century and the greater centuries to come. Boards of health and health officers have before them the opportunity to inaugurate and carry forward an education movement that will accomplish this.

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ON THE VALUE OF GASEOUS DISINFECTION.

In the discussion of the report of a committee at the recent meeting of the Massachusetts Association of Boards of Health there came a question as to the real value of gaseous fumigation of rooms and large spaces. The matter was one that had not been touched upon by the committee, its report being a general one on isolation and exclusion from school in cases of communicable disease. The question was from the floor and it became evident that some health officer wished to find something in the way of official expression to present to his home people support for the ideas that he held himself.

The point is a good one. It seems to be true that in the East many health officers are agreed on the low efficiency of fumigation of rooms as practised. The officials in some communities have practically discarded work of the kind. There is a conflicting mass of practice, despite which there exists the belief among many sanitarians that there is, in general, negligible value in the common procedure.

The health officer finds himself divided between his duty as he sees it and the somewhat costly process which the public insists upon. It is right that he should ask an expression from a source so authoritative that it will carry with the people, and for the benefit of such officers such expression should be set forth.

ON WASHING THE HANDS.

"Food, fingers and flies" has been in the past an excellent watchword of sanitarians. Today all research and all practice has been subdivided and it is worth while now to pay attention to individual factors that are here classed together. A modern watchword should be, "Wash the hands."

It is true that we do wash our hands some, but it is a practice that should be extended. The fingers touching everything and playing continually about the mouth convey to the lips whatever they may have collected. In the universal interchange of saliva, it is through the fingers very largely that the exchange is made. If the hands were washed frequently much of the exchange would be lost. And further, if the present idea concerning typhoid fever is to be accepted, its spread would be largely curtailed if people would wash their hands.

There is here a lesson that may be learned from the Hebrews. Following all bodily offices there is a little religious ceremony involving the washing of the hands, and this with other ablutions must count for much in the way of prevention.

One practice which seems worthy of place in the cleanliness of people is the washing of the hands after touching the shoes. The latter come into contact with whatever there may be of filth or infection on the pavement. This may be street, sidewalk, railway track or elsewhere. Washing the hands frequently is a sensible protective measure. In fact in those hospitals where the same nurse looks after different contagious diseases it is the chief reliance in preventing cross infection.

The city of Anderson, Indiana, has recently given a vivid example of what means Indiana health workers are employing to transform communities which have been passively waiting for health to be administered to them by the health officer, into communities alive to the necessity of active, united effort. Doctor Hurty of the Indiana

State Board of Health, informs us that Anderson held a Public Health Day last month, and from his description of what occurred, the plan was very successful. The whole city was for one day induced to concentrate its entire attention on plans for the improvement of public health. The newspapers advertised the event widely;

four public meetings were held on that day; a unique parade was planned in which three thousand people participated; the moving-picture theatres showed films concerned with public health work, and the merchants filled their windows with public health displays. The plan of the day's program was such that no one in the city, from the somewhat interested to the totally indifferent, could avoid in some way having his ardor awakened.

The meetings attracted many casual spectators, as well as most of the citizens already interested in active health work. The parade could not fail to attract the attention of the indifferent. The store windows and moving pictures suggested means and methods of securing cleanliness.

The parade in Anderson was the central spectacle of the day. It had many novel and original features. One was a large fly, six feet long, with a skeleton astride, arranged as a "float" on a large automobile truck. On the truck was also a broken-down manure box, and a leaking, overfull garbage can, over which was a sign "The Birth-place of the Fly." Behind this float marched fifty boy scouts, who stopped every half-block to give what they called their "anti-fly yell." Many health officers may be reticent to adopt such spectacular methods, and, indeed, such methods might not be suited to every community, yet in innumerable places it seems that this is to prove the only effective procedure. This procession in Anderson gave unity and point to the whole day's program, and through its unique symbols cannot have failed to make a lasting impression on the spectators. Moreover it aroused that active, militant spirit, and feeling of combined strength which is such a necessary stimulant to organized effort.

There was another feature of Anderson's public health day which deserves special attention. Anderson set an example for the other cities of the state. The Mayor of Indianapolis and of seven or eight other cities accepted the invitation of the Mayor of Anderson to be his guest and take part in the exercises.

This suggests that in any state where there are a large number of small cities, all mutual rivals for commercial growth, as in Indiana, the health officers can make this friendly rivalry serve as an active agent in state-wide coöperation for the improvement of health conditions. To use the local newspapers for calling constant attention of the townspeople to the relative desirability of their own town and the neighboring town as places of residence is a resource which might prove very valuable to a progressive health officer. Superior or inferior health conditions might frequently be made the object of lively civic pride if their relation to the city's growth and commercial prosperity were pointed out.

Whatever else the public health day in Indiana showed, it indicated that the wide-spread national movement for public health is working in under the shell of indifference of almost every community, and is preparing the people for quick response to local stimulus when it is properly applied by the local health officer. Some such specialized local stimulus as was used in Anderson must be lurking in the life of every city, ready to be utilized. If you, as a health officer, find great difficulty in making headway in your work, the discovery of this stimulus may make your efforts a hundred times more valuable through the resulting coöperation of the people.

ALL THE TYPHOID OF A COMMUNITY FOR FIVE YEARS FROM A CARRIER THROUGH MILK.

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*Director, Institute of Public Health, London, Ontario.**

Read before the Municipal Health Officer's Section of the American Public Health Association,
Colorado Springs, September, 1913.

In March, 1908, an outbreak of typhoid fever at North Branch, Minn., was investigated by the writer, then acting as Epidemiologist for the Minnesota State Board of Health, under the secretary of the Board, Dr. H. M. Bracken.

North Branch proved to be a prairie village of 700-800 inhabitants, *i. e.*, of about 150 families, chiefly Scandinavian. It is about 40 miles north of Minneapolis, on the Northern Pacific.

Following the first step usual to us in the investigation of all epidemics of doubtful origin, every existing case was individually sought out and cross-examined. They proved to be as follows:

Name.	Sex.	Age.	Date of earliest symptoms.	No. in family.	Evidence as to contact infections.
1 Mrs. C. S.	F	Adult	End of January	5	No preceding sick associates.
2 Mr. G. H.	M	Adult	End of January	2	No preceding sick associates.
3 G. R.	M	15	February 1	4	No preceding sick associates.
4 G. R. 's sister	F	20	March 6	..	Five weeks' association with the sick brother.
5 V. P.	M	5	February 1	5	No preceding sick associates.
6 R. Pn.	M	12	February 15	5	No preceding sick associates.
7 R. Pn's sister	F	3	March 10	..	Three and one-half weeks association with the sick brother.
8 C. L.	M	12	" 1	8	No preceding sick associates.
9 C. L.'s brother	M	8	" 11	..	Ten days' association with sick brother.
10 E. A.	M	Adult	" 11	5	No preceding sick associates.

* Now Executive Sec. Minn. Pub. Health Asso., Old Capitol, St. Paul, Minn. (On leave of absence from the Institute of Public Health.)

A study of this list shows 10 persons sick; three only (No. 4, 7, 9) give a history of association with previous cases. Of these three, No. 9, if secondary to his brother, must have contracted the disease from his brother, in all probability during his brother's incubation stage. This is not very infrequent in my experience. The other two (Nos. 4 and 7) if secondary* contracted their infections during the fastigia of their respective infectors, as may easily be seen by comparing the dates of earliest symptoms.

Eliminating these three cases (Nos. 4, 7, 9) as practically proved secondaries, seven persons (Nos. 1, 2, 3, 5, 6, 8, 10) are left to be accounted for. These are the primary cases from the histories of which the primary routes of infection, and hence ultimately the primary source, must be deduced. The first point to decide is when did they receive their infections? Was there a single occasion on which all were infected or did the infection occur from day to day for some time?

The average incubation period of typhoid fever from date of infection to date of earliest symptoms is exactly two weeks. But if a single definite infection of a large number of people occur on a given date, the cases arising therefrom will not all take sick exactly two weeks later.†

The first cases will naturally be those who have the shorter incubation periods. But even in a very large number of cases, the extremes are not likely to be greater than about one week for the shortest, three weeks for the longest, always provided that the date of earliest symptoms (not the date of going to bed, or of calling the physician) is used for the calculation.

The North Branch primary cases, arranged by dates of infection, group themselves thus: four cases (Nos. 1, 2, 3, 5) were infected about the middle

*There is little doubt in my mind that these three cases were really secondaries; although it is evident from the dates of earliest symptoms of Nos. 8 and 10 that the primary source of infection of the primary cases was still operating at the time when the secondaries, if secondaries, must have received their infection. My reasons for considering them secondaries are based on the theory of probabilities—thus: about 25 families, representing about 125 individuals, constituted, as will be shown later, the total group exposed to the primary source of infection. Seven of the 25 families were affected in the course of the outbreak, constituting a little less than one third of the possible number; the unquestionable primaries (the first cases in the 7 families) seven in number formed one eighteenth of the possible number. These figures give, then, a measure of the likelihood of any one family or any one person being affected by the primary source.

The second cases in each family occurred in three out of seven possible families; and in 3 individuals out of a possible 34.

But during the period when the second cases arose (March 6-11) the primary source attacked only two new families out of a possible 20 (i. e., those not yet attacked), thus involving only 2 individuals out of a possible 100 in these families. If now all the five cases, occurring at this time were from the primary source it would be hard to understand why the proportion of previously unaffected families attacked should be 2 out of 20, while the proportion of previously affected families attacked should be 3 out of 7 or over four times as great. Taken as individuals, the group of 34 represented in the 7 families would have yielded 3 cases, as against 100 in the 20 families yielding 2 cases, which is again over four times the due proportion.)

Evidently some factor existed tending to make typhoid fever much more likely to occur in the one group than in the other—and evidently this factor was the presence of a previous case. In fact, it may be stated as a general rule that the danger of contracting typhoid fever from a case in the same house is several times as great as the danger of contracting typhoid fever from anyone of the ordinary public routes—water, milk, flies or food—which may be operating at the same time.

†See "Mankato Typhoid Fever Epidemic of 1908," *Journal of Infectious Diseases*. November, 1911.

of January; one (No. 6) about the first of February; one (No. 8) about the middle of February; one (No. 10) about the end of February.

It is therefore impossible to select any one date of infection which will give reasonable incubation periods for all of the cases. To assume that the infection in January which gave rise to the first four cases gave rise also to the others would be to assume incubation periods of four, six, and eight weeks for the other three, respectively. Hence to "satisfy the equation" we must search for a continuous or at least repeated, infection taking effect four times at intervals of approximately two weeks.

Who was the source of that infection and what was the route of transmission? In a community supervised ideally from the public health standpoint, the infected persons, the only sources or possible sources of infection, would be known, listed, under guardianship. Should they infect any one, the development of the first case would be enough to precipitate an immediate "rounding up" of the "suspects," and the prompt discovery of why and how they or some one of them "fell from grace"—of why and how they or he broke the prescribed regulations sufficiently to cause such a disaster.

In the existing condition of affairs, however, we do not at first know whom to suspect, and the guilty party must be laboriously traced by discovering first the guilty *route* of infection and then following it back to its contaminator. This can hardly be done from the investigation of single cases and we must usually wait until there are several cases to work on in order to get data enough for deduction.

This *post hoc* method is the Sherlock Holmes method; but not half so practical or prompt as the regular police method, which consists in knowing the suspects, before hand, arresting them all, and making each prove himself not guilty if he can!

However, we are still in the Sherlock Holmes stage of public health epidemiology. Hence in most outbreaks of any infectious disease it is necessary to trace out the sources by careful deduction and reasoning, after the fact; not by foresight or knowledge before the fact.

In typhoid fever the possible routes are water, milk, food, flies and contact.

The general condition of these routes in the community and the particular conditions of these routes for each infected person, *at or about the date of infection*, must therefore be determined by minute, alert, patient enquiry, if the guilty route is to be found, and the infection traced to its source.

*Source is used to mean the person (sometimes in some infectious diseases, the animal) in whose body the germs of the disease in question are living, growing, and multiplying and from whose body the germs breeding there are distributed to other persons. Routes of infection are the physical conveyors of the germs derived from these sources—the physical mechanism through which the transfer takes place.

These general conditions may be summarized for North Branch as follows:

Water: Almost every family in North Branch possessed its own well; this was almost invariably a driven well, consisting of a sand point, to which lengths of $1\frac{1}{4}$ " pipe could be connected one by one. The sand point being driven down with a maul into the soft soil, a vertical length of pipe is screwed into it and also driven down, carrying the sand point before it; another length is screwed to the first and this also is driven down; this process is repeated until the point reaches water, usually at 15 to 30 feet.

In North Branch, sand overlaid hardpan, the thickness of the strata varying a good deal.

Such supplies are common in Minnesota and usually yield water which is well-filtered from the bacterial standpoint, but shows a more or less high, if harmless, chemical pollution, the degree of chemical pollution depending on the number and form of the neighboring privy-vaults, manure piles, etc. Such wells cannot be driven, practically speaking, except in very sandy soils; and therefore such wells are practically speaking always safe wells. At all events the writer has never been able to trace typhoid fever or dysentery to such a well.

Milk: About two-thirds (100) of the total families (150) in North Branch obtained milk from cows kept by themselves or by their immediate neighbors; thus there existed about 75 such sources of milk supply, supplying one or two families each.

The other one-third (50) of the total families obtained milk from two dairies, both situated near the borders of the village but on opposite sides. These two dairies divided the trade pretty evenly, having about 25 families each. Both were quite ordinary dairies, operated as family affairs, not better or worse than the average.

Food: The supplies were the ordinary supplies of the ordinary Minnesota town.

Flies: These, in March, were of course absent.

Contact: The usual opportunities for contact infection existed, here as everywhere.

These general conditions being given, the problem was to see how the special conditions surrounding each patient at his date of infection relate to them.

The seven primary cases, classified by ages, showed three adults (Nos. 1, 2, 10); three boys of school age (Nos. 3, 6, 8); and one boy under school age (No. 5).

Some of the local authorities strongly suspected the school well, which supplied the village school and drew its water from soil through which passed the school sewer. But the school well could not account for the three adults, or the boy under school age, unless they had used the school well,

as at an entertainment. Enquiry eliminated any such entertainment, or other equivalent. Moreover, only the boys were affected. A school well used by the whole school would surely affect girls also; especially since, in this village, the school girls were twice as numerous as the school boys. Nevertheless, careful inspection of the school was made, and all children detained from school were looked up, lest any cases might be missed. Subsequent analysis of the water, not used however in arriving at the conclusions here recorded, showed the usual conditions for this kind of soil—high chemical pollution, with practically no bacteria present.

Were the private family wells the source? Leaving aside the fact that the wells in use in North Branch can hardly be polluted by design, much less by accident, the fact that each of the infected families had its own well would exclude this method, except on the hypothesis that each well had been separately infected at or about the respective dates of infection for the families concerned. This extremely improbable hypothesis was practically eliminated by the fact that previous typhoid was too rare in North Branch to supply enough separate infectors to infect each of the seven wells.

A common infection of all the wells through the common water bearing stratum would be quite possible in some soils, but not in sand. Moreover such an infection would not give a random distribution of a very few cases, but a grouped distribution of a great many. These considerations quickly eliminated the water.

Infection of a small scattered number of people might occur from a common social source if they met at a club, church, society, etc., but the people infected in this outbreak did not belong to any one "set"; did not attend the same churches; did not employ the same grocers; did not even know each other to speak to, despite the small size of the village. To determine this point, the usual plan was followed of going over the whole list of patients with each individual patient; thus securing mutual rejection or confirmation of relationships from each of the patients concerning all the others. This eliminated "Social Typhoid" through food or contact, visiting the sick, etc. Flies were eliminated by the time of year (March), leaving milk the only remaining solution.

It quickly became evident that although, at the time of investigation, the infected families had no common milk supply, at the respective dates of infection every infected family had been users of the milk of one dairy, designated here, P. Not a single infected family had at that time used milk from the only other dairy.

The situation was this—of the 150 families in the village, 25 only used P. milk. Of the seven infected families, all belonged to this group. Hence of the 77 separate possible routes of transmission through milk, only one fulfilled the essential conditions.

At this point Dr. Thomas Zeien, the M.O.H., and the oldest of the two

physicians in the village, called attention to the fact that in his seventeen years' experience in the village, there had been no native typhoid fever for the first twelve. During the remaining five years, however, to date, native cases of unknown origin had not been infrequent, occurring in small scattered numbers at considerable and irregular intervals.

A list of these cases was secured, and a visit made to the P. dairy, where it was compared with their lists of customers.

In brief, it developed that the P. family had arrived and begun the milk business in North Branch just five years before; that of the 21 private native cases which had occurred since, 17 were definite customers, 2 occasional or indirect customers; the remaining 2 might have been. The other dairy had not at anytime any of these families as customers. Of course all this pointed directly to a carrier connected with the P. dairy.

The P. family consisted of two brothers: one milked, the other delivered. They had no hired help, and no visitors except a sister. Their father, mother, another sister and a grandchild constituted the family. There was no history of recent typhoid in any one of these; the brothers who handled the milk had never had it; but the father, mother and both sisters had had it *twenty-two years before*.

Careful cross-examination showed that no one handled the milk but the brothers; but *the mother washed the cans*. She however seemed a reasonably conscientious and cleanly woman, and showed hot-water facilities, maintaining that she used the water scalding hot always.

Infection of the milk by flies from the outdoor toilet used by the, as yet, hypothetical carrier was not possible at this time of year; the nature of the soil and the distance of the toilet from the well eliminated possible infection of the milk through the water supply, used in washing, possible adulteration, etc. It became evident then that the mother was the only carrier who could "satisfy the equation."

The evidence was so conclusive that I at once forebade any further handling of the cans by the mother; promising to close up the business if another primary case developed on their milk route later than two weeks after the date of the order.

This investigation occupied one day and one half. Arrangements were made with Dr. Zeien to send blood for the Widal test from the whole family, and feces and urine from the mother. These were examined at the Minnesota State Board of Health laboratories by Dr. A. J. Chesley, now Director of the Division of Epidemiology.*

The urine and feces were negative; the mother showed a positive Widal. Shorthandedness in the laboratory prevented following the matter up further. Fortunately the logic of subsequent events completed the evidence,

* Since, Director of the Division of Preventable Diseases.

thus; owing to the general public learning indirectly the source of the outbreak, the family closed up the business and moved away within a month of the investigation. During the five years that have elapsed since, not a single case of native typhoid has developed, as contrasted with 21 cases in the previous five years. Thus the village has returned to the typhoid-free conditions it enjoyed before the advent of the P. family.

The intermittency of the infection, despite the continuousness of the mother's work on the cans daily for the five years can be explained by the probable intermittency of the discharge of the germs from her body, by the fact that she usually kept her hands fairly clean, by the fact that she generally did use scalding water. Only when the combination occurred of the existence of a discharge of germs, infection of her hands from it, failure to wash her hands well, and failure to scald the cans well, did infection of the milk occur.

The small number of persons infected each such time probably depended on the fact that, in scalding the cans, she practically washed her hands clean when doing the first of the lot, the others escaping; and also by the fact that the people of North Branch on enquiry were found to use milk very little for drinking, and chiefly for diluting coffee; also the prompt delivery of the milk lessened the opportunity for any possible development in the milk of the typhoid bacilli introduced into it. The other dairy at times bought milk from P. The escape of all of their customers shows that they happened never to buy an infected lot.

ANALYSIS OF COST KEEPING AS APPLIED TO MUNICIPAL MANAGEMENT OF STREET CLEANING.

F. C. BAMMAN.

Read before the Sanitary Engineering Section of the American Public Health Association,
Colorado Springs, September, 1913.

The Acts of Congress approved March 2, 1911, making appropriations for the expenses of the District of Columbia for the fiscal year ending June 30, 1912, authorized the commissioners to perform certain work previously done under contract, namely, street sweeping and cleaning alleys and unimproved streets. As hand patrol work and street washing were already under municipal control, this Act enabled the commissioners to take over all street cleaning and also brought about the recognition of street cleaning as an engineering problem and the transfer of the Department to the Engineering branch of the service, under United States army engineers, and in direct charge of a civil engineer. One of the direct results of this change was the establishment of a modern cost keeping system which would allow the application of some of the principles of scientific management as well as show any saving or increase over contract cost.

The Street Cleaning Department in Washington is, of course, part of the District of Columbia machinery and subject to certain general rules regarding its operation. The cost keeping system, in an effort to conform with these rules and, at the same time, check with the accounting system, represents hardly an ideal system or one which can be adopted haphazard by another city. At the same time, it should be noted that a study of the reports from various cities, made in the hope of obtaining suggestions and ideas not only failed in this particular but also showed a surprising lack of uniformity in terms used and results obtained.

Our failure to find a model on which to base a cost keeping system for street cleaning required a painstaking examination of conditions in Washington, the development of a crude system based largely on common sense and the refinement of this system to the present satisfactory but not ideal or perfect system, representing almost two years' work.

As already noted, the cost keeping system was developed along the simplest lines, direct charges being made wherever possible and indirect items being pro-rated according to the easiest method. Three sets of unit costs are obtained. The first consists of the sum of those charges which are directly dependant on the foreman or gang, such as pay rolls, and is the working total, representing, as it does, those charges which admit of direct comparison. It is also of value in comparing with the former contract prices in Washington as the overhead charges are, to the city, practically

the same as under contract, the present foreman then acting as inspectors and the office force being about the same. This total added to the indirect costs such as superintendence, etc., gives a second total, of value in comparing local costs with those of other cities where these items are included, to which, for a third total, is added a theoretical interest on investment, depreciation, etc., for comparison with outside contract cost. These last totals are only computed annually, the first or working unit cost being compiled monthly.

Owing to the natural difficulties and problems arising on first taking over the contract work, it was not until September, 1911, that any detailed study could be made of the cost keeping records. It was found that the unit costs, as compared with contract prices, were lower for all classes of work except alley cleaning. Under contract, alleys were cleaned for 40 cents per thousand square yards, while the figures for September, under municipal operation, gave 43.3 cents. Special study was then given to the alley gangs and various experiments were tried, including the use of an alley machine broom, which, in October, reduced the cost of one gang $5\frac{1}{2}$ cents per thousand square yards. New schedules were arranged which, so far as practicable, eliminated dead travel and the various foremen were carefully informed of the success of their rivals. The average for April, 1912, showed a cost of 21.8 cents while the yearly average was 32.4 cents per 1,000 square yards or $7\frac{1}{2}$ cents less than the contract cost.

Another example, this time in machine broom cleaning, might also be given. The contract cost for this class of work was $22\frac{3}{4}$ cents and the September figures for the four municipal gangs ranged from 17.9 cents to 15 cents. This variation in cost was due principally to the difference in the equipment of the various gangs, the high gang having two sprinklers and five machines while the low gang had only one sprinkler and four machines.

The general opinion throughout the Street Cleaning Organization, previous to this cost record, was that the two-sprinkler, five-machine combination, was the cheapest as a much larger amount of area was covered. Experiments were begun of different combinations of sprinklers and machines with a view to finding, in connection with the cost keeping, the most efficient combination. Odometers were placed on the apparatus and the various combinations tried out. As a result, a uniform combination of one sprinkler and three machines was adopted for the entire city. The cost for April, corresponding to the 17.9 cents for September, is 15.5 cents while the minimum April cost is 12.2 cents, the average cost for the year being 16.2 cents or over 6 cents less than contract.

It was found that the two-sprinkler, five-machine combination was high in unit cost because of the non-productive sprinklers and that, while the machines were traveling about twenty-five miles per day, the sprinklers

were only making around fifteen. The four-machines, one-sprinkler combination, on the other hand, gave the lowest unit costs, the sprinkler charge being divided among four instead of three productive machines, but it was found that the sprinkler horses were traveling between thirty-five and forty miles per day in an effort to keep ahead of the machines, the latter traveling about twenty-five miles. The one-three combination, on the other hand, while slightly more costly than the one-four combination, reduced the sprinkler travel to about that of the machines.

As necessary adjunct to the cost keeping, profiles and records have been developed, all of which tend to efficiency in various branches and consequently affect the cost of the direct street cleaning. Such would be a comparison of the cost of running different makes of automobiles, the cost of feeding, shoeing, hostlery, etc., at the various stables, the relative efficiency of each stable and the livestock as a whole, the cost of manufacturing and repairing apparatus and supplies, the record of area cleaned and dirt collected by the white wings and the plotting of their relative efficiency.

As an example of the detail to which the system is applied, the following might be cited. The rubber brooms for the squeegee machines, as received from the factory, have the rubber attached to the wooden strips by means of small wire nails and leather washers. It was found more economical to make these brooms in Washington by employees of the department and accordingly leather washers were made from scrap leather. The cost records showed that the cost of these nails and washers averaged about three dollars per broom. This seemed very high and an investigation of the detailed cost showed that the principal outlay was labor. Sheet leather was then used instead of scrap and the cost reduced to less than two dollars, proving that it was cheaper to throw away scrap and use good leather, an apparent waste. Further experiments were then made with the idea of doing away with the washer entirely and at present, after trials of different combinations, a heavy galvanized nail with an extra large head is being used with satisfactory results, the cost per broom being about sixty cents.

As an example of the educational and competitive value of a cost system, the records of the street cleaning stables are plotted on profile paper and show the total horses, the number working, sick, convalescent, etc., and also the efficiency of the stable, this last being obtained by dividing the total number of horses by the number fit for work. The stable bosses are practical horsemen, not at all accustomed to clerical work or cost accounting. When municipal operations were started, it was necessary to purchase a number of unacclimated horses, a fact which, combined with the extremely hot weather, caused a good bit of sickness in the stables. Early in October, the above mentioned profile was developed and it was found that the average efficiency of the combined stables was about ninety per cent. and that instead of coming up during the cooler weather of September,

it even dropped as low as eighty-six per cent., the one stable being slightly better than the other. As the average cost of keeping a horse is about one dollar per day, it was an easy matter to show the foremen the effect of this low percentage on the direct street cleaning costs. At the same time the difference between the percentage of the two stables was brought out and the foremen asked for explanations. It was made plain, however, that there was no suspicion that they were derelict in their duty but, on the contrary, that they were working for the best interests of the department and would do their best to improve any conditions called to their attention.

The direct result of this conference was an upward trend of the efficiency curve, at times to the 100 mark and averaging about ninety-eight per cent. to date.

Similar action is taken whenever any matter is to be called to the attention of any foreman, whether shop, stable or field. The results of such a conference are very prompt and positive, especially so, as by this time the men realize that no reflection on their ability is intended and that the office is far better equipped than they to see defects and outline remedies.

It is impossible to show, without a mass of detail, involving blank forms, tables, etc., the innumerable ways the cost keeping system, directly or through data compiled as a result of cost keeping methods, has increased efficiency. Changes are being made daily and errors in judgment on the part of foremen or higher officials are found, at first very often but as a result of the education due to the study of such errors, only occasionally at present.

The principal advantages of such a system may be summarized as follows:

First. Gives the detailed cost for each gang, for each class of work or for any particular feature which may be under investigation, in such form as to admit of analysis of any variation in previous costs or comparison between similar details of other work, as well as showing the result in any change of method.

Second. Provides a means of determining the relative efficiency of foremen or laborers and provides a tangible record for educational purposes, giving in money the effect of any internal change in the make-up of a gang and means of competitive comparison between gangs.

Third. Gives records of intermediate costs such as stable, repair shop or office expense, in which the greatest possibility of saving lie, in terms which admit of comparison with other departments or firms as well as internal comparison between two units, such as two stables of the same department.

Fourth. Gives repair costs, which in time, will give comparison as to the relative efficiency of two similar pieces of apparatus of different manufacture as well as a check on excessive repairs, etc.

These represent probably the most important uses of the system as

developed at present. New applications are constantly coming up to create fresh interest and to keep the system alive. Often some new item will creep into a standard report, be investigated and result in a new train of thought and study, with increased efficiency and renewed interest, not only in the new features but necessarily in the routine which is required to develop the working figures.

In closing, a word of caution. The local system has been in operation about two years. During that time many changes have been made, not in principle, but in detail, and it is expected that others will be necessary. The Washington system, as a whole, will probably fit no other department in Washington nor the Street Cleaning Department of any other city. Cost keeping is necessarily a process of first, evolution, and second, elimination. This department has gone through the first and the question now is can we do without this detail or how may we obtain it with less effort?

The experience here has been that the best way to obtain satisfactory cost keeping data is to go slowly. Not to hire an expert for two weeks or two months to develop a system but to put someone in charge of the cost-development, have them read, study and investigate other systems and then develop that system best fitted to the particular needs of the work and educate the force to a proper understanding of the results obtained.

RECENT PROGRESS IN METHODS AND CHARACTER OF STREET CLEANING.

S. WHINERY,
Consulting Engineer, New York.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

There has been no radical or particularly notable advancement during the last few years in the machinery and methods of street cleaning in American cities. But no little progress has been made in improvements upon methods and appliances that have become standard, and their more efficient and economical use, in complying with the public demand for cleaner streets than had heretofore been tolerated, and in a more careful study and analysis of the business, especially with reference to detailed cost of the work, for the purpose of effecting economies.

MACHINERY AND APPLIANCES.

Since the advent of street-flushing wagons and horse-power squeegees, little that is new or novel in street cleaning machinery or appliances has come into use.

The flood of patents issued for street-cleaning devices continues unabated but these patents relate largely to details and disclose little of value for practical use. This is somewhat surprising in this land of inventors. Most of our street-cleaning apparatus is admitted to be more or less crude and unsatisfactory, and there would seem to be possibilities for material improvements, if not radical innovations. The application of mechanical power in the place of horse-power to street-cleaning work has received attention and has been tried in a number of cities, but the results do not seem to have sufficiently commended themselves to municipal officials to warrant their more general use at present. The operation of the present street-cleaning machines by mechanical power involves such practical difficulties that its successful use is somewhat problematical, but there would seem to be a useful field for it in the collection and transportation of street sweepings, especially where the haul is long.

Hand cleaning (patrol) appliances have not progressed much beyond the common hand-broom and scraper, though hand pick-up sweepers are in use in a number of cities and seem to be growing somewhat in popularity.

The application of the vacuum or suction principle to the picking-up and collection of street dirt is also being experimented with to a small extent. Such machines, if they can be perfected so as to do the work satisfactorily and economically, would have the great advantage of removing the dust from the street without resort to the use of large quantities

of water, which is a consideration of importance where water is scarce or high in cost.

THOROUGHNESS AND EFFICIENCY.

There has been in the past few years a decided advance in the standards of cleanliness of streets demanded by the public and attained by the municipal authorities. This is noticeable both in the large, and in the smaller cities of the country. Not only are the main streets kept in a cleaner condition but the area of cleaning has been extended and more attention given to the proper cleaning of side and secondary streets, and particularly to outlying territory where the streets were heretofore cleaned imperfectly and infrequently.

In towns and the smaller cities, and the suburban section of the larger cities, where earth and broken-stone street surfaces prevail, the use of oil to suppress dust has greatly increased, and is now quite general. While this is not, strictly speaking, a street-cleaning process, it serves as an effective temporary substitute for cleaning and marks a revolutionary improvement in the comfort of using such streets, and eliminates the sanitary danger and the inconvenience and damage, from flying dust.

Much greater attention than ever before is now given to the promotion of efficiency and economy in this department of municipal work, and it may be said that while the quality of the service has improved, its cost has not, as a rule, increased in the full ratio of the increase in population.

ACCOUNTING AND ANALYSIS OF COST.

Perhaps the most promising and fruitful advance that has been made in recent years is the greater attention given to the study of the details of street cleaning and the keeping and analysis of more complete and itemized accounts. The older accounts and reports of street-cleaning departments were so barren in details that they were generally of little or no value to either the student or the practical man. Beyond a general statement of the receipts and disbursements and the division of the latter among a few general heads, and rough estimates of the quantities of materials handled, little information of real value was to be had from them. This is, unfortunately, still true of most printed reports, but in an increasing number of cities the accounts of the street-cleaning department have been revolutionized and expanded so that the total and unit cost of every important detail of the work may be ascertained and analyzed. This requires, of course, greater attention to the collection of exact data of quantities and costs, and involves no little additional expense, but it is becoming more and more appreciated that the money so spent is wisely invested, since the main reliance for increased efficiency and economy in this, as in most other lines of business, must be upon small savings in many details rather than upon any radical changes in methods and

machinery. The value of the results of practice and experience in other cities for comparative study is becoming more appreciated, and there is, therefore, growing up a strong demand for the general adoption of a uniform system of accounting, and for more complete and detailed printed reports of street-cleaning departments:

SOME PROBLEMS THAT ARE RECEIVING ATTENTION.

Some of the important matters that have more recently, and are now receiving increased attention may be mentioned:

One considerable source of the dirt and waste that must be removed from the streets is commonly called street litter, consisting of miscellaneous wastes thrown upon the streets and sidewalks by those passing along the streets, or swept out of business houses and residences. Street littering is effectively prevented in most European cities by the rigorous enforcement of laws or ordinances prohibiting it. Most of our American cities have such laws and ordinances, but they are practically "dead letters." Spasmodic attempts have been made to enforce them in a number of cities but public opinion has not sufficiently sustained these efforts, nor have the municipal authorities, as a rule, made their enforcement practicable by providing an ample supply of receptacles into which such litter may be deposited.

In recent years, there has been renewed agitation of the matter by street-cleaning departments and by the more intelligent part of the public, and it is hoped that the time is not far distant when the necessary receptacles for litter may be generally provided by the municipalities, and the ordinances against street littering rigidly enforced.

An important step in this direction must be the collection of more complete and accurate data as to the quantity of such litter handled and the additional cost of collecting it when thrown upon the streets. In New York City the street-cleaning department has given attention to this matter and estimates that the additional cost thus imposed on the department amounts, approximately, to \$270,000 annually. This very large sum could be saved to the city yearly by providing convenient receptacles for litter and then enforcing the ample ordinances already existing. European experience has proven beyond doubt that this may be done without imposing any serious inconvenience to the public.

When it is considered that this litter is handled by human hands or is swept out of residences and business places and is therefore subject to infection by disease germs, the sanitary importance of collecting and disposing of it as directly and quickly as possible is obvious.

The possible utilization of street sweepings in some way that will partly repay the cost of street cleaning is another matter that is receiving more attention than heretofore. The most promising outlook for such utiliza-

tion lies in the direction of filling low lands, or building up new and very valuable areas of land by filling in shore areas now covered by shallow water and at present not useful for any purpose. Contrary to the prevailing opinion, experience and investigation have shown that street cleanings free from garbage may, if properly handled in the dumps, be so used without danger to the public health and without serious inconvenience or offense to the public.

Street sweepings from paved streets contain very considerable quantities of valuable fertilizing elements, the value of which at the market prices of these elements, probably averages at least two dollars (\$2.00) per ton of sweepings. The cost of transporting and handling the raw sweepings is usually too great to permit of their profitable use as fertilizers in the farming districts, but some satisfactory method ought to be, and probably will some time be discovered to profitably recover these fertilizing elements.

Attention is being urged in many cities toward preventing the large accumulation of dirt and débris, and the inconvenience and expense to street-cleaning department, caused by building operations. Custom seems to have given builders the idea that they have a right to deposit the waste from their operations upon the fronting streets and that it is the duty of the street-cleaning department to remove and care for it. A number of cities have taken suitable action in this matter and others will doubtless follow.

The removal of snow from the streets and its disposal is, in our northern cities, a matter that gives the street-cleaning department a great deal of trouble and anxiety. The service is usually required for only a few days each winter, but the prompt clearing of the streets when it does become necessary is a work of such magnitude and complication as to call for extraordinary measures and effort, and the unit cost of the work is necessarily so high as to call out unfavorable comment by those who do not understand the difficulties involved.

In recent years, the organization and preparation for this emergency work has received much attention and the service now rendered in many cases must impress any one conversant with the difficulties involved as remarkable and highly praiseworthy. In this work, the old and well-known methods and appliances continue to be used. Doubtless new and efficient machinery for the work could be devised but the cost of installing it and the very short time it could be utilized, makes it very questionable whether in the end it would prove a good investment. Theoretically, it is not impracticable to design apparatus to melt the snow on the street at a cost below that of loading it upon the wagons and hauling it away, but when it is considered that such apparatus could be operated for but a few days, at most, during the year, the cost of providing it would probably not be warranted.

UNIFORMITY IN ANNUAL REPORTS OF LOCAL BOARDS OF HEALTH.

FREDERICK L. HOFFMAN,
Newark, N. Y.

Read before the Joint Sessions of Sections on Statistics and Public Health Officials, American Public Health Association, Colorado Springs, September, 1913.

The practical importance of uniformity in vital statistics requires no argument or discussion. All scientific conclusions are relative, and unless the facts for one locality are strictly comparable with the facts for another the utility of the information for each must necessarily be much less. Every study of some particular disease emphasizes the neglect of our municipalities to give due consideration to recognized principles of statistical practice in the annual presentation of the vital facts of the community. There is nothing more lamentable in our public health history than the apparent indifference on the part of those who prepare the annual reports to the following of long established and universally approved methods of presenting the vital facts of the community in the most conclusive and useful manner. In this respect our American cities are far behind the large cities of England for which the annual reports on health and mortality are models of their kind. At the present time it is practically impossible to make a precise and conclusive comparison of the health administration of one American city with another on the basis of local annual reports. Obviously, the first duty on the part of every health official is to make the statistical presentation of his facts conform to the established rules of statistical practice of the Division of Vital Statistics of the Census Office, and then if possible or desirable, add such additional information as may be called for by the needs or peculiarities of the local situation, for necessarily the census reports are limited to the more essential facts suitable for statistical presentation, and on account of limitations of space and the required brevity of the reports not much attention can be given to minor, but often locally quite important, details.

In an address on "Some Suggestions for Improvements in Vital Statistics," presented to the American Statistical Association in 1907, I had occasion to discuss in some detail the most urgent needs for reform in present-day methods, but it is regrettable that, as far as it is possible to judge, there is no tendency towards a material improvement, but in some conspicuous cases rather the reverse. In a somewhat similar address on "Municipal Vital Statistics," read before the Fifteenth International Congress on Hygiene and Demography in 1912, I again directed attention to what may properly be spoken of as a lamentable state of affairs which emphatically demands a much larger share of public consideration than the subject has received in the past. It is certainly not a matter of mere per-

sonal opinion as to how the vital facts of a given community shall be presented from year to year, whether in a varying form, or in an abbreviated form, so as to preclude the scientific and practical utility of the data for local as well as for general purposes. There is no more glaring contrast in any branch of the government of the municipalities of the United States and England than in the generally crude and more or less useless annual health reports of our American cities, and the thoroughly scientific and yet strictly practical manner in which the local health statistics are presented to the taxpayers of the counties and large cities of the United Kingdom. Uniformity in the reports is, therefore, of the utmost importance, but as yet the various suggestions which have been made to bring about the required reforms in this country have been to small purpose. Many of these suggestions in the past have indicated an almost complete failure to realize on the one hand the past efforts which have been made, and on the other the really practical utility which all vital statistics are obviously intended to serve. It would, therefore, seem that a new committee on uniformity in the annual reports of local boards of health should be appointed, and that the membership of such a committee should be selected with extreme care to secure more than perfunctory performance of duty. As is only too often the case, reports of this kind are prepared by some one reasonably familiar with the facts or interested therein, and the conclusions are approved by the majority. Unless, however, there is intelligent coöperation on the part of men thoroughly qualified for the work, the results will be again as barren in the future as they have almost always been in the past. Personally, I am a very strong believer in the practical utility of the annual reports of local boards of health, including an extended and thoroughly qualified analysis of the local vital statistics precisely coördinated to local public health problems. I am also strongly impressed with the great value of the reports as issued in the past, but I feel that much better results could have been secured, and as a matter of public duty should be secured, by means of easily obtainable improvements, chiefly in the direction of uniformity in the presentation of the facts of annual health experience. Our urban population numbers, according to the census of 1910, 49, 348, 883, so that the problem affects about 54 per cent. of the total population of the country. The task is not a difficult one, but the problem, for its successful solution, requires the intelligent coöperation of thoroughly qualified and disinterested men, and if such a committee as is here suggested is appointed, its membership should be selected by the chairman with the greatest possible care. The work of such a committee should be coördinated to the efforts of the recently formed Central Committee on Coöperation in Public Health Agencies, of which Mr. John M. Glenn is the chairman. The committee should take into the most careful consideration the reports as at present published by the larger cities throughout the world, so that its final recommendations may represent the highest ideal attainable at the present time.

THE PERIOD OF INCUBATION OF DIPHTHERIA CULTURES.*

HENRY ALBERT, M. D.,
Iowa City, Ia.

Read before the Laboratory Section, American Public Health Association, Colorado Springs,
September, 1913.

The need of giving a report on diphtheria cultures as quickly as possible is appreciated by all. Although a five to eight hour period of incubation is frequently all that is necessary to secure a sufficient growth of diphtheria bacilli so as to be to give a positive diagnosis, there are many cultures that require a twelve to fifteen hour incubation and, as was shown by Slack and Arms at the 1908 meeting of this section, reincubation and reinoculation of typical diphtheria cultures incubated for fifteen hours is often desirable.

When the examining staff is limited to such size that only one examination of a culture can be made, I think it may be said that a twelve to fifteen hour period of incubation should preferably be chosen. Such a rule can be much more readily carried out in city laboratories which receive most of their cultures late in the afternoon than in state laboratories which receive most of their cultures early in the morning. Thus about 90 per cent. of the cultures which reach the state laboratory in Iowa are received before 9 o'clock in the morning. They are immediately entered on our record book and placed in the incubator. The tubes are given a naked-eye inspection at 5 o'clock in the evening. Those that present evidence of growth are examined microscopically at that time; the remainder and also those examined microscopically in which the growth was not sufficient or in which suspicious forms were found are placed back in the incubator and examined the following morning.

During the warm months, *i. e.* from about June 15 to September 1, we find that it is possible to make the final microscopical examination late in the afternoon of the same day that the specimens are received, in about 90 per cent. of the cases. Indeed, about 75 per cent. present a visible growth at the time they arrive at the laboratory.

During the colder months, however, we find that very few present a growth at the time they are received and that only about 16 per cent. present a visible growth late in the afternoon of the day they are received *i. e.*, after an incubation of about eight hours.

The purpose of the investigation on which this paper is based, was to determine whether or not it was worth while to examine our diphtheria cul-

*(A study made to determine whether or not it is worth while to make examinations of cultures at 9 o'clock P. M. after an incubation of twelve hours.)

tures at 9 o'clock in the evening, *i.e.*, after a twelve-hour incubation, in order that a report might be sent out by the night mail which may reach any part of the state the following morning. Accordingly a large part of the diphtheria cultures received during the months of March, April and May, 1913, were examined at 5 o'clock, and again at 9 o'clock of the day they were received and at 8.30 the following morning. A microscopic examination was made of every culture at each of the three times whether there was a visible (to the naked eye) growth or not.

The results of these examinations are presented in the following tables:

RESULT OF EXAMINATIONS OF DIPHTHERIA CULTURES AFTER DIFFERENT PERIODS OF INCUBATION.

When examined (1913).	Number exam- inations.	5 p. m.			9 p. m.			8.30 a. m.			Per cent. of posi- tives first found at 9 p. m.	
		8 hrs. incub.			12 hrs. incub.			24 hrs. incub.				
		Pos.	Neg.	*	Pos.	Neg.	*	Pos.	Neg.	*		
March.....	44	3	5	36	5	9		30	11	26	7	18 %
April.....	548	20	62	466	64	149		335	229	304	15	19 %
May.....	262	21	28	213	42	68		152	143	103	16	14 %
Total.....	854	44	95	715	111	226		517	383	433	38	18 %

The last column gives the percentage of the total number of positives which were first discovered at the 9 o'clock p. m. examination. The temperature conditions as far as the growing of diphtheria cultures are concerned for the month of April are about the same as during the colder months since the temperature of the post-offices and mail cars is kept up by artificial heat.

It appears therefore that during the colder months, *i.e.*, from (October to June) 12 per cent. of the cultures that ultimately prove to be positive can be diagnosed correctly after an eight hour period of incubation and that 30 per cent. of the cultures that ultimately proved to be positive, can be diagnosed correctly after a twelve-hour period of incubation. This means that 18 per cent could be diagnosed as positive for the first time only after a twelve-hour period of incubation.

CONCLUSIONS

1. By making examination of diphtheria cultures at 9 o'clock p. m., reports on 18 per cent. of the specimens which eventually prove to be posi-

* No insufficient growth; suspicious forms; etc.

tive will be received by the attending physician, twelve to twenty-four hours earlier than when the examination is left until the following morning.

2. As a result of these examinations we have adopted the following scheme for the examination of all diphtheria cultures received at our laboratory in the morning during the colder months of the year:

A. Place all cultures in the incubator immediately on receipt.

B. Inspect all the cultures at 5 o'clock p. m. and make a microscopic examination of all that present a growth visible to the naked eye. Those which are positive may, of course, be reported upon immediately. Those which are not positive should be returned to the incubator.

C. Repeat the procedure as outlined under B—at 9 o'clock p. m.

D. Make microscopic examination of all cultures not reported on before early the following morning.

In conclusion, I desire to acknowledge the assistance of Mr. A. M. Alden and Mr. H. E. Harlow, rendered in the making of the examinations.

THE USE OF HYPOCHLORITE CAPSULES FOR THE TREATMENT OF SMALL QUANTITIES OF DRINKING WATER.

H. A. WHITTAKER,

Assistant Director Laboratory Division, Minnesota State Board of Health.

Read before the Laboratory Section. American Public Health Association, Colorado Springs, September, 1913.

The need of some practical and exact method for dispensing hypochlorites in the small quantities necessary to treat private or camp water supplies and for the use of travelers using water from questionable sources, has long been recognized. The method described in this paper has proven a very practical and efficient way of handling and preserving the small quantities of the chemical necessary for such purposes.

The method consists of diluting the hypochlorite salt with sodium carbonate, whenever necessary, to provide sufficient bulk to handle such minute quantities conveniently. This mixture is then placed in glass capsules which are hermetically sealed. The calcium salt of the hypochlorites is to be preferred for this purpose on account of its stability.

The details of preparation are as follows: The calcium hypochlorite is dried for one hour in a hot-air oven at a temperature of 50°C. after which it is cooled in a desiccator and its strength in available chlorine accurately determined. The sodium carbonate is also dried in a hot-air oven for one hour at 100°C. and placed in a desiccator until ready for use. The amount of calcium hypochlorite necessary to manufacture a given number of capsules is placed in a mortar and ground to a fine powder, and the proper quantity of sodium carbonate is added with constant stirring. The final mixing is brought about by sifting the resulting powder at least six times through a No. 50 sieve. This dilution with sodium carbonate is necessary only when the total weight of the calcium hypochlorite to be dispensed is less than 50 milligrams per capsule, as this amount of chemical is sufficient to provide a bulk convenient for handling. The tubing from which the capsules are made should be of soft glass, preferably amber-colored. The diameter of the tubing and the lengths into which it is cut are varied to accommodate the contents. The tube lengths, however, should be such that the total amount of chemical added will not occupy more than two-thirds of the length of the tube so as to allow for sealing. In the preparation of capsules which require dilution with sodium carbonate, *i.e.*, when the chemical content is less than 50 milligrams, it has been found most convenient to use glass tubing 3 millimetres in diameter, cut into 3.2 centimetre

lengths. One end of each tube is sealed in an oxyhydrogen flame before filling. The filling of the capsules is conveniently accomplished by means of a little glass or brass funnel and a small measure resembling the ordinary powder gauge used in loading cartridges. The latter is provided with a movable bottom which permits of an adjustment for filling different size capsules. The funnel should have a stem small enough to fit loosely into the mouths of the tubes. It has been found that with this method the variation in the chemical content of each capsule is very slight. After the contents are placed in the tube its open end should be sealed in an oxyhydrogen flame. Finally each capsule is scratched with a file half way between the ends to provide a point at which it will easily break when the contents are desired for use. These capsules should be stored and dispensed in amber-colored, wide-mouthed vials, to afford protection from light. For the convenience of the user, it is advisable to prepare them in sizes suitable for the treatment of water in the more common containers such as a glass, a pitcher, a pail or a barrel. In applying the chemical it should be evenly distributed throughout the water by a thorough mixing. The exact amount of hypochlorite necessary to successfully treat a water varies considerably and great care should be taken to add sufficient chemical to exterminate the common water-borne disease-producing bacteria. In most drinking waters that come under observation in this state, one part per million of available chlorine is sufficient to kill these organisms, yet some waters high in organic matter, either in solution or suspension, may require larger amounts.

Although the action of the hypochlorite is very rapid, it is recommended, when the larger receptacles are employed, to apply the chemical twenty minutes before the water is to be used.

It is not the intention of the writer to advocate the indiscriminate use of these capsules, but to recommend them to public health workers and others having some knowledge of the water to be treated and who are competent to advise as to their proper application.

REPORT OF THE COMMITTEE ON ORGANIZATION AND FUNCTIONS OF THE MUNICIPAL HEALTH DEPARTMENTS.

Read before the Section of Public Health Officials, American Public Health Association, Colorado Springs,
September, 1913.

In the closing paragraph of the report of this committee submitted at the annual meeting of the Association, held in Washington, D. C., September, 1912, reference was made to the fact that the functions of municipal health departments could not be fully discussed without touching upon the relations between municipal, state and federal health authorities. While many of the public health problems require local solution, yet to command and hold the respect that public health measures must have in order to be effective, there should be a consistency of action by health officers throughout a country, which can only be secured through uniformity in the laws, which in turn should be based upon the highest knowledge in preventive medicine and sanitary science. Your committee has, therefore, decided that it can best serve its purpose for this meeting by presenting some suggestions along the foregoing outline, with the hope that if found practicable they may lead to a more complete report on the relation of municipal health departments to state and federal health authorities.

For the sake of brevity when the word municipal is used in this report, it is meant to apply to health departments having local jurisdiction only, such as in townships, boroughs, towns or cities. Likewise, the word state applies equally to state, province or district, as the case may be, for the problems of interdepartmental relations are much the same, whether maintained in Cuba, Mexico, Canada or in the United States. Again, by federal authorities, it is intended that the term shall apply to the general government of any of the countries.

The well-recognized functions of public health authorities are those activities concerned with:

1. Vital statistics.
2. Communicable diseases.
3. Care of waste and refuse.
4. Water supply, food, air, housing.
5. Child hygiene.

The underlying principles involved in regulating activities in all of these functions are of general application, and an analysis of the health laws of the various states and provinces and of countries abroad, with the view of arranging a program to show clearly how uniformity could be best secured

through a federal department of health, would no doubt hasten the date at which such department will be organized as a branch of the general government at Washington. For example, when we consider the present differences existing among states as to maritime quarantine regulations, making it possible for a vessel to land at one port and yet be prohibited from another, or subjected to tedious detention, or when we realize that in some ports both federal and state quarantine stations are maintained with differing jurisdiction and conflicting regulations, which may operate to the embarrassment of commerce, without affording additional protection to health, we may safely say that here is a field for improvement which could probably be best obtained by having all maritime quarantine stations under federal control.

Quarantine measures are also matters of international concern, and while many questions of great importance to public health have been adjusted in former years by special commissions and conventions, yet the increasing fleets of swift steamers, passing between international ports in less than the incubation period of some communicable diseases, oftentimes causes much trouble in ports of entry and give rise to perplexing situations, which could be best adjusted through federal departments which are in close touch with the municipal health departments. Again, the pollution of interstate and international streams will not be satisfactorily solved until federal departments are authorized and equipped to control such pollution.

The Constitution of the United States is framed to "promote the common welfare and to provide for the common defense," and while it would be mere conjecture to state that many of the activities which we deem vital in the present day were foreseen by the framers of that important document, and, though possibly they had in mind the invasion by a visible foe rather than the invisible hosts we are combating, when they provided for the common defense, yet the breadth and the reasonableness are there, and in that Constitution itself is the warrant for the establishment of a national department of health to conserve and to protect the public health, which should be of equal importance to war, or commerce or labor, or any other department, and in the last analysis if the health of a nation is not conserved, of what use are any of the others.

VITAL STATISTICS.

In following the theme of this report, we know that federal governments in taking hold of the problems of the registration of vital statistics through the Bureaus of the Census, have, by the introduction of the international classification of the causes of death, already done much to eliminate the inconsistencies and inaccuracies of vital statistics, and stand forth as an example of what may be achieved in problems which are nation-wide in their extent. The support of the American Public Health Association to

this important work is testified to by its section on vital statistics, and it would be superfluous for this committee to say more than to urge the continuation of the support and encouragement of the Association toward that vigorous and useful section.

COMMUNICABLE DISEASES.

The improvements in transportation facilities during the last twenty-five years have so extended the radius of man's activities in his daily life, that the work of controlling communicable diseases has long since ceased to be only a local problem. It is frequently found in tracing the history of a person ill with a communicable disease, that he has been infected while at some remote place and may have traveled widely during the incubation period, and while in a state capable of transmitting infection may have been in contact with many persons. It is perhaps impracticable at the present time to secure national laws to regulate the control of communicable diseases. However, state laws are practicable and will provide for uniformity of action throughout a state; in fact, several states already have good laws on this subject, and this Association could, doubtless, do important service in promoting this needed uniformity.

The task of administration is by no means easy, and the ideal appears to your committee to be a strongly manned state department, acting ordinarily in an advisory capacity, yet with power for mandatory action in cases of need. This is particularly true in the case of typhoid fever, which is fast passing from an urban to a rural excess, due to the greater activities of cities to suppress this scourge, and where the cities must now adopt measures to prevent its introduction from rural sources. It is by no means an infrequent occurrence in the conduct of a municipal health department to find an infection from typhoid having occurred from an unreported rural case. In some places coöperation between municipal and state officers is doing much to reduce offenders in this direction, and this coöperative action can do much in the absence of close organization of the municipal departments and the health department of the higher units of the political divisions.

CARE OF WASTE AND REFUSE.

Under this heading we have to deal with our old familiar—Nuisances—and the archaic laws which every health department has inherited from the days preceding the development of the germ theory as to cause of diseases.

The care of waste and refuse is largely a local matter but there should be state regulation to provide for uniformity of action and prevention of the disposal of such matter in any manner which would be detrimental to a person or property beyond the jurisdiction of the local authorities. Many

states have already enacted statutes under acts to control the pollution of streams which give a measure of control over trade wastes, and generally we are progressing so that in many places it will soon be necessary for any industry to retain its wastes, to render them innocuous and cease turning them into streams to the detriment of their neighbors and the destruction of the national resource of waterways.

WATER SUPPLY, FOOD, AIR AND HOUSING.

The supervision of these commodities and utilities should be based on broad lines laid down by federal authority, with delegated powers to states to govern local administrative officers, to the end that condemnation of movable commodities by a municipality would be condemnation in fact, as well as in name, and not result only in a mere shifting to another market, as may now occur in some cases.

The pollution of the air is most acute in the large centers of population, and general state laws, with local administrative authority, will probably be as far as we can hope to go, until public opinion will arise in stronger support of measures to prevent the pollution of the air or support the needed measures for better ventilation.

The housing problem is now largely a local matter and is developed in accordance with the enlightenment and progressiveness of communities. It is in large part a matter for state regulation, and as in several states commissions are at work endeavoring to codify our building laws and remove inconsistencies, which permit radical breaches of good building on opposite sides of dividing lines of political subdivisions, so will we in time secure uniformity in our requirements for good housing. Health officers may do much to create the right public opinion on these subjects.

CHILD HYGIENE.

The appalling mortality in infants, especially in congested centers of population, also the evils of child labor, have attracted nation-wide attention with local interest in proportion to the progressiveness of states and cities throughout the world. The problem has both social and health aspects, and health officers should not fail to rise to the occasion and lend every aid and support in securing legislation uniform in principle for these activities which, though in the formative stage, are rapidly taking shape and will have far-reaching influence on the future. There is little divergence of opinion on what is desired. There is, as yet, great diversity in action. The problem is so large and its effects are such that national, state and local authorities must unite in order to secure the successful solution, and national guidance will do much in assisting to direct local efforts.

It is now well recognized that one of the most effective ways of promoting

public health is by educational methods. Many municipalities and states are doing excellent health educational work but we doubt not that great economic saving and greater efficiency could be secured if a central body, such as a federal health department, standardized health literature and arranged for its thorough distribution, and also provided expert service for advice, investigation, or any of the similar functions now oftentimes duplicated or in many cases wholly lacking.

Your committee realizes that in this brief report it has but outlined and touched upon the surface of questions which are vital to the progress of public health work. Each of the subjects treated is worthy of a painstaking and exhaustive investigation and report to point the way to uniformity of public health measures, and if they have succeeded in suggesting any thought that will further this Association, which has already done much in standardizing and stimulating the activities in public health work, the purpose of your committee has been served.

J. A. VOGLESON, *Chairman*,
A. J. DOUGLAS, M. D.,
A. S. FELL, M. D.,
JESUS MONJARAS, M. D.,
FEDERICO TORRALBAS, M. D.

HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS.

Edmonton, Alberta.

The situation in Edmonton is unusual. From a population of twenty-five hundred in 1901 it had increased to twenty-five thousand in 1911, and in 1913 the population was seventy thousand. The area of the city has increased even more rapidly until now it includes over twenty-seven thousand acres, or more than four-tenths of an acre per capita. It may readily be seen that with such a development many problems must arise which are difficult to solve but which must be handled promptly and thoroughly. The report of Medical Officer of Health Whitelaw for 1913 indicates that he has the situation well in hand although such questions as the disposal of refuse and the extension of water and sewer service over so large an area are still causing trouble.

Strictly speaking the report covers the period of fourteen months from October 31, 1912, to December 31, 1913 as the fiscal year has been changed to correspond to the calendar. Most of the reports, however, are planned to show the rates for the year as giving the figures for the entire fourteen months. The death-rate for 1913 was 10.73; the birth-rate, 23.0; and the infant mortality rate, 171.11; the latter figure probably being high as a result of incomplete reporting of births but accurate death reports, and on account of the large foreign element and overcrowding of houses with the accompanying unsanitary conditions. The com-

municable disease rate is high, as might be expected on account of the rapid immigration with the resulting importation of disease and difficulty of getting early reports of cases. Measles was especially active and shows a record of 975 cases and 29 deaths, both figures being the highest among all communicable diseases. Smallpox is fairly well controlled by compulsory vaccination of school children and of persons exposed to any case which may be imported.

The difficult task of street cleaning and scavenging has been turned over to a new city department, much to the relief of the health department. Dairy and milk inspection has been placed in the hands of two new men, apparently as a result of the incompetency of those formerly holding the position and the 1913 report indicates that they have been carrying on active and valuable work which has resulted in considerable improvement. The treatment of vital statistics also deserves favorable notice.

Recommendations for future improvement include the appointment of a visiting nurse, the establishment of additional public comfort stations, the improvement of housing conditions and the institution of work in popular education on public health matters.

The report is in general well prepared and is very interesting. A few additions, such as a financial statement, a list of the staff of the health department, etc., would be an improvement.

Cincinnati, Ohio.

Dr. J. H. Landis, Health Officer of the City of Cincinnati, Ohio, presents the report of the department of health for the year 1913. During the latter part of June and first of July the health department was placed in a rather extraordinary position due to a strike among the employees of various ice companies. The city council authorized the health

department to buy ice to sell to the people. But the situation became so acute by July 2, that the health officer was authorized to seize and operate the ice plants in order to allay the widespread suffering on account of the ice famine. Following this the ice plants were seized and operated for a period of four days, when the differences between

the companies and employees were finally settled. During the time the strike lasted, over twenty-three thousand dollars was received for the sale of ice. The total cost to the city after settling all claims was \$757.20. The handling of an ice famine by the health department, due to a strike, is a unique problem but was overcome in a very efficient manner by the Cincinnati officials.

Continuing in his introductory report, Dr. Landis gives a summary of the year's work and outlines the needs of the department. The following summary of statistics illustrate in a way the efficiency of the health work; the general death-rate for 1913 was 16.89 per 1,000 population, which is an average figure. Of particular interest is the very low typhoid death-rate—6 per 100,000 for 1913. This places Cincinnati fourth in a list of fifty of the largest cities in the country. The death-rate of 5 per 100,000 for scarlet fever is also very low. It is noted that measles has a rate of 16.8 and whooping cough of 12.5 per 100,000, both being much higher than the rate for either typhoid or scarlet fever.

The reports of the various divisions of the department are very well presented, several of them containing photographs and all have statistical tables. One of the most important divisions is that of Medical Inspection and Relief. Aside from the usual work of surveillance of infectious diseases, school medical inspection, etc., several physical examinations of registered prostitutes was carried out at different times in order to determine the prevalence of venereal disease. All diseased persons are quarantined in the

hospital. Reports from three specialists are to the effect that, since the work of locating and quarantining cases in the hospital was begun by this department, fewer advanced cases are treated in the hospitals and clinics and fewer new cases are applying for treatment in their private practice.

What is especially creditable in the work of the health department and more noticeable in this division, is the hearty cooperation with various private and charitable organizations. Much practical work has been carried out with pretuberculous children in the open air schools. The improvement in the health of these children was marked.

Under the laboratory division are shown photographs of two very fine new laboratories, one for bacteriology and the other for chemistry. During the year 1913 a total of 15,266 samples of various kinds were examined. Of this number, 8,245 chemical and 1,811 bacteriological examinations of milk were made. In the diagnostic work, 1,769 tuberculosis sputum samples and 2,148 diphtheria cultures were examined. It is evident from the scope of the work shown, that new working quarters were necessary.

The financial statement shows that \$126,010 was expended on health work. This was divided as follows:—general administration, \$11,930; sanitary inspection, \$14,264; medical inspection, \$43,466; food inspection, \$21,831; laboratory, \$4,281; tuberculosis dispensary, \$2,427; vital statistics, \$1,740; bond ordinance, etc. (which includes ice strike and ice plant emergency), \$26,068.

Taking this report as a whole, it may be classed as one of the most progressive which comes to our notice.

Corning, New York.

The annual report of the health officer of Corning for the year 1913 consists of about two columns in the evening paper. Corning appears to be far in advance of many cities of its size, as far as public health work is concerned, and is fortunate in having as progressive a health officer as Mr. Swain.

The health officer is assisted in his work by a visiting nurse and by a sanitary and plumbing inspector, both of whom are given credit for conscientious and effective work. It is interesting to note that the recommendations for improvement include the employment of

another nurse whose duty will be the following up of the conditions demonstrated by the inspections of the school physicians. A county hospital for the care of tuberculosis and a local isolation hospital for other contagious diseases are also needed. The city water supply is reported as dangerous and in need of improvement although the high typhoid rate is attributed to the use of wells known to be contaminated.

No report of infant welfare work, dairy inspection or finances is given.

Toledo, Ohio.

The Board of Health of Toledo, Ohio, present their report for the year 1913. The first thing noticed on taking up the report is the short summary of vital statistics printed on the outside front cover. This is a good idea, for in many reports one has to search some time before finding out the population and the death- and birth-rate.

In the report of the health officer, Dr. Becker, is given a general statement of conditions and needs of the department. The amount of \$49,260 is asked for to carry on the work for the ensuing year, but there appears to be no financial statement to back up this budget. Such a statement is really one of the most important items of a health report.

Apparently Toledo is rather conservative as regards spending money for health. Dr. Becker calls attention to the need of a full-time medical inspector and bacteriologist and also of a full-time chemist. For a city of 180,000 population these two officers are very necessary.

The typhoid fever death-rate in Toledo is quite high being 41.5 per 100,000. Dr.

Becker gives as the main reason for such a high rate the fact that there are a large number of surface wells which are still in use.

During 1913, there were 249 cases of diphtheria with forty deaths giving a rate of 22.2 per 100,000, and a fatality of 15.56 per cent. This, too, is a rather poor showing and mainly because the doctors of Toledo have not all been educated to the early use of antitoxin. However improvement is being made along this line.

The section on vital statistics has some very interesting comparative and mortuary tables.

Although there is apparently no work along the line of infant welfare, the report of the registrar of vital statistics contains a very interesting spot map, showing by spots each infant death during 1913. This is a good object lesson to use in an appeal for organized work for infant welfare under the department. It is to be hoped that next year's report will show that Toledo has awakened to some of the big public health problems that her health department is striving with.

DEPARTMENT NOTES.

County Health Associations in Michigan.

In many, perhaps most, localities there is not a sufficiently general knowledge or appreciation of the value of public health work to occasion a demand for a county health officer. Where the movement for county health officers is being undertaken, the following plan from an article in the June number of *Public Health*, the monthly bulletin of the Michigan State Board of Health, may prove a valuable educational preliminary.

"The movement to organize county good health associations is rapidly progressing. Starting with Jackson county, quickly followed by Hillsdale county, the latter making the organization a permanent one, and now comes Barry county which is making arrangements for a good health week. Other counties are perfecting arrangements for a county good health organization patterned after

the Hillsdale county movement. This is encouraging evidence of the rapidly growing spirit of sanitation among the people. We earnestly plead for a county organization in every county. Where conditions prove that a county organization cannot be developed, why not organize city, village and township good health movements? Such organizations could do a great good, indeed much good has already been done.

"Good health being the essential part of education, why could not the good health movement be incorporated with teachers' associations, where health associations are not separately organized?

"Hillsdale and Barry counties good health movements include commissioner of schools, teachers, grangers, all health officers in the county, women's clubs, officers of municipalities, in fact, everybody who lives and wants everybody else to live. The motto

of the good health county movement is, 'Education is to know for the sake of living.'"

Practical Tenement House Department Work.

"The death-rate in New York City is now the lowest that it has ever been. Several causes have tended to bring about this desirable condition. Among these causes there can be no question that the careful and systematic attention now being given to sanitary conditions by the various city departments charged with the supervision of such conditions should occupy the most prominent place. In this connection the tenement house department has recently instituted a new procedure which is of interest. The department obtains from the board of health a record of all deaths and cases of contagious or infectious diseases occurring in tenement houses.

"While it cannot be maintained that all forms of contagious diseases are directly chargeable to bad plumbing or to the sanitary conditions, and while it can rarely be proved that in any particular case the contagious or infectious disease arises from the condition of the house, it is a well known fact that there is a distinct relation between such conditions and contagious and infectious diseases in general.

"The department, therefore, is giving special attention to houses in which it appears from the board of health records that there have been an unusual number of deaths or cases of contagious or infectious diseases.

"Whenever the health records show that three or more deaths or cases of recorded diseases have occurred in a tenement house during the month, or that five or more such cases have occurred during the two previous months, a special inspection of the tenement house is ordered forthwith so as to ascertain whether there are any plumbing or sanitary defects existing at the premises. If any such defects are found, orders are immediately issued, together with a special communication to the owner calling his attention to the health record and to the defects.

"In most instances the owners have shown

a greater spirit of coöperation and compliance than had been expected by the department, and it is believed that this procedure will accomplish much in obtaining prompt compliance with the department's orders in such cases."

National Municipal Review, July, 1914.

Report of Tuberculosis Commission in Kentucky.

"Kentucky, by an act of the legislature, established a commission in 1912 for the study of tuberculosis. The first report of that commission, a cloth-bound pamphlet of sixty pages, sets forth what has been accomplished. The work so far has been chiefly preliminary and educational. An exhibition car and moving-picture exhibit, teachers' institutes, a nursing service and the distribution of much printed matter have been some of the means employed. Special county campaigns in coöperation with local organizations have also been conducted. The further work of the commission will consist not only in keeping up the educational campaign, but also in the establishment of local sanatoriums in the districts into which the state is to be divided. The report shows that much interest has been aroused and much good work done."

Jour. of the A. M. A., June 13.

Work of a Large Modern Health Department.

The leading article of the June 27 issue of the weekly *Bulletin* of the Department of Health of New York City is entitled "Watching the Health Department at Work" and consists of a resumé of a single week's activities in the nine bureaus of the department. It is introduced as follows:

"Not so many years ago it was believed that the proper functions of a health department were limited to the registration and tabulation of certain vital statistics, to the abolition of nuisances, the inspection of premises in order to discover damp cellars, leaking cesspools, foul drains, etc., and to matter relating to the spread of the more readily communicable diseases, such as

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smallpox, diphtheria and scarlet fever. In accordance with this conception, the Department of Health of this City was organized into two bureaus, the Bureau of Records, and the Sanitary Bureau. Contrast all this with the modern conception of the duties of health authorities: Diagnostic laboratory work, production and distribution of anti-toxic sera and vaccines, performance of intubation, home supervision of tuberculosis, hospital and sanatorium treatment of tuberculosis, school medical inspection, intensive work in infant hygiene, supervision of midwives, control of the milk supply, bacteriological research, and organized public health education!"

Child Welfare Work in Canada.

The May issue of the *Regina Health Bulletin* announces that, in order to prevent the increased infant mortality of the summer months, the health department will undertake systematic child welfare work. For this purpose, a special nurse has been engaged to furnish advice and assistance to anyone desiring her services. In addition a babies' milk depot has been opened where babies may be brought for examination and where mothers may be advised as to the care of the child, proper feeding, etc. A weekly clinic has also been arranged.

Public Health Administration.

Health and Hygiene, the bulletin of the Louisville Department of Health, contains the following brief extracts from a recent paper by Assistant Surgeon-General W. C. Rucker.

"At a recent health meeting in Chicago, Assistant Surgeon-General W. C. Rucker, United States Public Health Service, read a most excellent and thorough paper on the subject of 'Public Health Administration.' The following are extracts from his paper:

"Three things are necessary to efficient public health administration,—the man, the power and the starting point.

"The knowing what you want to do, in public health work, is practical epidemiology, a knowledge of which is possessed by a relatively small number. The power with

which to do it is legal and financial. Both are necessary.

"Eternal vigilance is the price of freedom from disease. The epidemiologist must, therefore, devote all of his time to his official duties.

"Public health officials must be full-time officers. They must be adequately salaried.

"Public health is a rather expensive necessity, and if the general public wants it, it will find that it cannot get it from poorly prepared, underpaid men.

"The corner stone of efficient public health administration is the well-qualified, full-time, well-paid health officer.

"Granted an efficient public health administrator, he is powerless without legal backing. This legal backing is sanitary law.

"Idle laws are worse than no laws at all. One of the most useful things which could be done in furthering the cause of public health would be a revision of the sanitary laws, and the repeal of laws which are impractical of administration, or which, if administered, would defeat the purpose for which they were enacted.

"We have been marvelously illogical with regard to our vital statistics.

"We have collected data upon births, marriages and deaths, none of which conditions is particularly dangerous to the public health, and have almost entirely lost sight of the sick man who is the point from which most human diseases are disseminated.

"It is the living carrier of disease which is dangerous.

"Above all, a spirit of coöperation is essential. This coöperation begins with the practicing physician

"Every practicing physician of intelligence realizes that if he fails to do his duty in this regard, he not only endangers the health of his patients, and their families, but also of the community at large.

"When physicians fail to report cases of communicable disease, it is either the result of ignorance, carelessness, or a desire to protect the interests of their patients. They would not be imbued with the latter desire if the general public were in thorough accord with the spirit of preventive medicine.

'It seems to the practical health administrator as though the most important single thing which should be taught in the campaign of public health education which is now going on would be the necessity for making prompt and accurate morbidity reports.

'Public health can be bought at a price. Compared with the returns it brings, the price is not high.

'It is necessary that the public health administrator demonstrate in terms of dollars and cents that public health and public wealth are inseparable, and they are practically synonymous terms.

'The value of coöperative effort cannot be overestimated. Among people who do not earnestly desire health, it is well nigh impossible, without the use of force, to bring about sanitary reforms.

'Three things are necessary to efficient public health administration: the man—the well trained, well remunerated, full time, health officer; the power—the intelligent, uniform, accurate law, and the adequate appropriation; the knowledge of the location and prevalence of disease, in order that it may be controlled by the coöperative effort of the general public, the medical profession, and the public health administrator.'"

Security of Tenure of Health Officers.

Mr. Lloyd-George, Chancellor of the Exchequer, has received a deputation of the British Medical Association, the Society of Medical Officers of Health, the National Housing and Town-Planning Council, the Mansion House Council, the Rural Housing and the Sanitation Council, and the Royal Institute of Public Health on the subject of the security and tenure, and the superannuation of health officers. Among the points argued were that the health officers were practically under the direction of persons whose defects they very often had to point out, that superannuation should be given at the age limit, that they were liable to dismissal at three months' notice, that in one instance a health officer had been asked by his council to rewrite a portion of his report, and that it was impossible for health officers

to be as fearless in the interests of the public good as they should be. Replying, Mr. Lloyd-George said that the speeches represented a case that only had to be stated to carry conviction to fair and impartial minds. The powers entrusted to local authorities even at the present moment were enormous. He should like to see some of these powers considerably strengthened, but he was convinced that until greater independence was insured for the officers who would administer those provisions, it was idle for Parliament to waste time in carrying more acts. Security of tenure to health officers and inspectors must be an essential part, if not an essential preliminary to any further legislation dealing with the housing question. He had had letters from health officers saying that they dared not report the true facts, and that the reports sent to the Local Government Board did not represent a tenth of the facts in their areas. Therefore he was whole-heartedly in sympathy with the demand, and the government had felt that there ought to be specific grants for a substantial part of the salaries of the officers concerned, and that they should be in a position to demand from the local authorities greater security of tenure.

London Letter in the *Journal of the A. M. A.*, July 11.

Hand Laundries.

"The Sanitary Division is very busy this month going through all hand laundries (mostly Chinese) in the city, as all applicants for renewal of license must obtain from the health officer a certificate that the premises are suitable and satisfactory for the purpose. After application for renewal is made, an inspector visits the premises and notes all defects. Duplicate specifications are then made out of all work required to be done in order to make the premises comply with the Laundry Regulations, and a copy served on the applicant.

"As these laundries have in previous years been required to install impervious laundry tubs, concrete floors in washrooms, adequate plumbing, ventilators, etc., the present specifications relate mostly to the thorough cleansing and renovating of such premises, includ-

ing walls, ceilings, woodwork, etc., together with the repair of any dilapidations, defective or foul water-closets, etc. This year we are also measuring up all the sleeping rooms, and carding each room with the exact number of men allowed to occupy same. This is necessary on account of the number of prosecutions we were obliged to make last year for over-crowding of such rooms.

"Several inspections are frequently necessary before permit can be issued, and by the time we get through issuing permits the laundries will be in a much better and cleaner condition than ever before.

"There are 145 such hand-laundries in the city.

"The new regulations of Council render it very difficult for any new laundries to be started up."

Winnipeg Health Bulletin, June.

Pasteurizing New York's Milk Supply.

Without a doubt, the control of the milk supply of the city of New York is one of the hardest tasks the health department has to deal with. The weekly *Bulletin* of the Department for June 6, 1914, reports that about 99 per cent. of the supply is pasteurized, which is an exceedingly creditable showing.

"The situation regarding the compulsory pasteurization of all except the highest grade of milk sold in this city is extremely satisfactory, at the present time about 99 per cent. of the city's supply being effectively pasteurized. This represents an enormous improvement over conditions a year ago, and should make milk-borne disease a rarity in this city.

"The change has been accomplished with a surprisingly small number of arrests and prosecutions. Where the department encountered undue delay on the part of milk dealers in complying with the pasteurization regulations, civil suits were brought to recover judgment. This mode of procedure proved highly efficacious. It undoubtedly has many advantages in certain circumstances over the criminal proceedings brought by other cities in the United States for the same purpose. If the facts are proved in a civil suit, there is no such thing as a suspended sentence.

"The pasteurizing plants are subject to close supervision by the Department of Health, and large numbers of samples of milk are being examined bacteriologically to check up the efficiency of their operation.

"The Department has had the cordial co-operation of all the large milk dealers and of nearly all the smaller ones, and there is every reason to believe that at the present time the milk supply of this city is of better quality than that of any other large city in the world.

Saloon Sanitation.

In a large number of places the saloon is an evil which is difficult to overcome. But if it must be with us, the sanitary conditions, at least, ought to be made as good as possible. In their weekly bulletin, the Board of Health of Cincinnati, Ohio, report the work which they are doing on this subject. It would be well for other cities to look into this matter also.

"In the fall of 1913, following a vote by the people, the number of saloons in the city was reduced to 802. All saloons thereafter were licensed, regulated and inspected by the state.

"To secure cleanliness, adequate fixtures, sanitary methods and practices tending toward prevention of disease is the object of the systematic inspection inaugurated in February by the local health department.

"Common towels, unclean glasses, defective plumbing and drainage, filthy or obstructed toilets, common forks, dirty free lunch dishes, expectoration on the floor, etc., unquestionably subject the patrons to the liability of contracting various contagious diseases.

"Men of all types—well, sick, rich and poor—frequent saloons. What better way is there of contracting and transmitting skin and venereal diseases than by using one of the 724 common roller towels that were hanging at the bars, toilets, lunch counters, and wash stands of 431 saloons? As a location for a common towel, can you imagine a worse place than the lavatory in a public saloon? Common towels are now prohibited. The more progressive proprietors are installing individual towels.

"In 151 saloons the inspectors found the glasses dirty. Tuberculosis, diphtheria and other bacterial germs of the throat and mouth have been found on the common drinking cup. Because you pay for the drink, the law permits the common glass to remain, but paying does not prevent you from picking up the germs left on the dirty beer glass by a preceding user. Unclean glasses were found in some of the best saloons in the city.

"The common fork glass located at the free lunch counter was originally placed there with good intentions by the proprietor, but the slovenly habit of eating with the forks has placed it under the ban of the department. A basket of clean individual forks, to be kept filled by the porter, is the substitute recommended. Forks are provided to remove the food from the plate to the hand and must not be used to put food into the mouth.

"One hundred and thirty-seven saloons had filthy cuspidors or bar drains, while the sixty-eight which provided no cuspidors resulted in frequent spitting on the floor—a filthy and dangerous habit.

"On the first inspection 773 saloons were visited; 75 were rated as bad, 296 as fair, 381 as good, while only 21 met every requirement and were rated very good."

Health Activities in Panama.

Panama is so far away that we do not often stop to realize what is going on down there. According to the June 17, 1914, issue of the *Canal Record* several important measures are being carried on at present. A uniform type of metal garbage can with self-closing cover has been adopted and it has been made mandatory that property owners provide their premises with these cans at their own expense. The adoption of these cans has done away with a large amount of the nuisance due to the former old-fashioned methods.

An active milk inspection is being carried on, and the health office is now preparing to make a tuberculin test of dairy cows and meat cattle.

The Panama health officer has also established a score card system in connection with the inspection of bakeries, hotels, restaurants,

and other places where food is manufactured or served. Fifty is the minimum score permissible and the owners who fall below this are subject to a fine, or the closing of their quarters. The score is given below. It would seem as if a little too much value had been placed on cleanliness of tables and furnishings, but not enough on attendants' personal cleanliness.

	Perfect score.
Room free from contaminating surroundings.	4
Tight, smooth floors.	2
Tight, smooth walls and ceiling.	2
Light (sunlight, 4; electric light, 2; gaslight, 1)	4
Ventilation.	2
Large, convenient sinks.	4
Convenient furnishings and machinery.	2
Cleanliness of floors.	6
Cleanliness of walls.	4
Cleanliness of ceiling.	2
Cleanliness of tables and furnishings.	10
Cleanliness of sinks, 4; shelves, 2.	6
Utensils-mixers.	4
Utensils-pans, 2, knives and cutters, 2.	4
Clean cloths for rolling jelly rolls, etc.	2
Freedom from flies, cockroaches, and other insects.	12
Attendants' aprons and overalls.	4
Attendants' personal cleanliness.	4
Storage for materials—flour.	2
Storage for materials—milk, eggs, etc.	2
Washroom and lockers.	2
Water closet.	2
Patio, yard, or alleys.	2
Disposal of refuse.	4
Storage of baked goods.	4
Transportation—wagon.	2
Transportation—drivers and methods.	2
Total.	100

Proposed Change in New York's Street Cleaning.

Commissioner John T. Fetherston of the Department of Street Cleaning, New York City, has recently proposed a plan for reorganization of the system of street cleaning and refuse disposal for the city and has asked that a model district be established to test the value of the plan. It is estimated that for one district the improvements will cost \$253,000, but will bring about a yearly saving of \$54,432 compared with the present cost. The *Engineering Record* of June 27 gives the general outline of the plan briefly as follows:

"The main feature of the proposed plan is the replacement of horses with motor-tractors, each fitted with three types of trailers, one for street flushing or sweeping, one for refuse disposal, and the third for plowing, sweeping and hauling snow. The tractor-trailer system, obviously, is one of great flexibility, for no single motor will be limited to a single kind of work and working hours will not be confined to a single shift. By extending the functions of the equipment and increasing the hours of work for the tractors fixed charges will be decreased and lower costs will be secured than is possible with horse-drawn equipment. This is not guesswork. A careful analysis of the situation was made and the conclusion is based upon first costs and costs of operation, taking into account the extra hours of work for the tractors as compared with horses.

* * * * *

"For collecting refuse, a trailer body fitted with removable compartments to hold at least ten cubic yards of refuse will be provided and so designed that material from the standard cans will be transferred to an appropriate compartment without creating dust or nuisance. All classes of refuse will be collected at one time and not more than one collection trip per day will be made through any street. This will result in all cans being removed from sidewalks and areas except at the removal period, which can be closely timed for every street.

"The report goes farther than the cleaning of streets. It makes provision for the collection and disposal of refuse. Under the new system the separation of household refuse into three classes will be continued and each building—in the model district at least—will be furnished with a set of cans. The garbage can will have an attached cover and will be painted a distinctive color to distinguish it from the ash can. Rubbish will be tied in bundles as required by existing ordinances. The distinguishing feature of the proposed method of handling the garbage, therefore, is the closed system which will obviate present nuisances from odors, flies, dust and loose paper. In place

of open dumps at the waterfront a closed transfer station with an electrically operated telfer system for unloading the refuse containers from vehicles to scows is recommended."

Public Health Organization in India.

The Medical Officer (London) contains in its issue of July 4 a brief review of a recent report of the Government of India on recent reforms in connection with sanitary administration in that country. It is pointed out that sanitary progress is necessarily slow on account of the primitive nature of the people, their ignorance, superstitions, and social customs, and the slight friction which naturally exists between the two races. We clip the portion of the article which tells of the form of administration:

"Since 1912 the Sanitary Commissioner, whose office had been created as a result of the Plague Commission's report to Lord Curzon's Government, has been the independent adviser to the Government of India in all technical and sanitary matters, but all questions of personnel, as well as the administration of the bacteriological department and research generally, have been placed under the control of the Director General, Indian Medical Service, with the Sanitary Commissioner as his staff officer. The superior or central sanitary organization in India now includes a Sanitary Commissioner with the Government of India; a bacteriological department which has five centres, each having one director and various assistants; and fifteen new appointments have recently been sanctioned for the prosecution of research work and directing investigation in the field. The eleven local governments have each appointed a sanitary commissioner, and all but the government of the sanitary province of Delhi have appointed deputy sanitary commissioners. In nearly every province health officers and sanitary engineers have also been appointed. The policy of the Government of India is to keep the control of research under itself, but to decentralise other branches of sanitation. It is considered that while the whole general direction of a policy of public

health should remain with the central government, all detailed control and executive action must be left to the local governments. The sanitary commissioner with the Government of India is a touring officer empowered to consult and confer informally with local governments and their officers upon matters connected with sanitation. He is not permitted to encroach upon the authority of local governments over the officers under their control. In every province sanitary boards have been established with varying powers, some being merely advisory, others having authority to sanction schemes and allot funds. These boards are composed of officers belonging to the medical, sanitary, engineering and other branches of the civil services with the addition of non-officials.

"Some difficulty has arisen in providing means for the training of the superior sanitary staff. A British diploma in public health is required from candidates for the posts of deputy sanitary commissioner and health officer of the first class, and training classes for sanitary inspectors are now held in all the important provinces. The posts of deputy sanitary commissioner and health officer are now open to Indians." Nine deputy sanitary commissioners out of 26, and the majority of health officers, are Indians. The new bacteriological department, in which 28 officers are employed, is also open to duly qualified Indians."

State Control of Local Health Authorities.

"Home Rule and Health" was the subject of a statement given out not long ago by Dr. E. F. McCampbell, secretary of the Ohio state board of health, Columbus. It was prompted by opposition in the Ohio legislature to a bill giving the board authority to remove an incompetent local health officer and by opposition to another bill providing for state supervision of tuberculosis hospitals. Dr. McCampbell said in part:

"Centralized control is needed in matters pertaining to the public health. Home rule would be dangerous. Disease does not respect political boundary lines. The water supply of one town is frequently polluted by the carelessness of another town

in permitting refuse and sewage to enter water courses. The occurrence of infectious diseases in municipalities is quite frequently due to the fact that they have been imported from the country districts or from other municipalities.

"The administration of public health work should be kept distinctly out of politics and efficient and trained men should be in charge of the work. As a matter of fact, much more would be accomplished if the state would take the major portion of the authority away from the local communities and by so doing it would be possible to place an expert sanitarian in charge of each municipality or district."

National Municipal Review, July, 1914.

A Novel Milk Contest.

A Milk Contest was recently held in Portland, Oregon, under the direction of the Bureau of Animal Industry, United States Government, and the Bureau of Health. Mr. F. H. Bothell, Assistant United States Dairy Investigation, conducted the contest, assisted by Prof. R. R. Graves, professor of dairying, Oregon Agricultural College, and Dr. H. B. Marcellus, the health officer.

This was a preliminary contest of a series of four to be held during the year. The product of all dairies and city milk plants will be rated upon the results of these contests and the samples analyzed by the health department.

In the contest, 156 samples or 312 bottles of milk were collected from 92 dairies, 16 pasteurizing plants and 14 city milk depots. Very few of the samples showed any appreciable amount of visible dirt. The average butter fat was 4.0.

The product of 92 dairies supplying most of the raw dairy milk in the market scored as follows:

Over 90.....	9.8%
Over 80.....	63.2%
Over 70.....	79.3%
Over 60.....	85.0%

The product of 16 pasteurizing plants scored as follows:

Over 80	18.8%
Over 70	50.0%
Over 60	62.5%

The product of 14 milk plants scored as follows:

Over 80	7.2%
Over 70	64.2%
Over 60	81.4%

In spite of the fact that the contest was held on three of the warmest days, there were only a few of the samples showing a high bacterial count. For instance, 23 per cent of the samples of raw dairy milk contained less than 10,000 bacteria per cubic centimeter—which is considered excellent. 37 per cent were under 20,000, 58 per cent under 50,000, 71 per cent under 100,000, and 83 per cent under 200,000, the maximum count allowed by the Ordinance.

During the contest all marks of identification were erased from the bottles, so that the judges did not know whose milk they were passing upon.

The dairymen knew nothing of the contest beforehand and samples were collected from the wagons—two bottles being taken in each case.

The results of this system will amount to this—when a man begins to market his milk in this city, he enters into competition with other expert dairymen. The laws of supply and demand will regulate the price according to the quality of the goods. Poor milk will command a low price.

It is anticipated that the dairymen will enter very keenly into this competition. The plan is to give suitable diplomas or prizes for the winners in each class at the end of the year.

PUBLIC HEALTH NOTES.

The Use of Borax to Prevent Flies from Breeding.

The Department of Agriculture reports that a small amount of ordinary borax, sprinkled daily on manure, will effectively prevent the breeding of the typhoid or house fly. Similarly, the same substance applied to garbage, refuse, open toilets, damp floors and crevices in stables, cellars or markets, will prevent fly eggs from hatching. Borax will not kill the adult fly nor prevent it from laying eggs, but its thorough use will prevent any further breeding.

The investigation, which included experiments with many substances, was undertaken to discover some means of preventing the breeding of flies in horse manure without lessening the value of this manure as a fertilizer for use by the farmer. It was felt that if some means of preventing the breeding of flies near a human habitation could be devised, the diseases spread by these filthy germ carriers could be greatly reduced. While the "Swat the fly campaign," traps and other devices for reducing the number of typhoid-carrying flies are of value, they are of less importance than the prevention of the breeding. It was realized, however, that no measure for preventing the breeding of flies would come into common use unless it was such that the farmer could use it on his manure pile without destroying its usefulness for growing plants, and without introducing into the soil any substance that would interfere with his crops.

As a result of experiments carried on at the Arlington Farm, in Virginia, and New Orleans, La., the investigators found that 0.62 of a pound of borax, or 0.75 of a pound of calcined colemanite (crude calcium borate) would kill the maggots and prevent practically all of the flies ordinarily breeding in eight bushels of horse manure from developing. This was proved by placing manure in cages and comparing the results from piles treated with borax and from untreated piles. The borax, it was found, killed the

fly eggs and maggots in the manure and prevented their growth into flies.

In the case of garbage cans or refuse piles, two ounces of borax or calcined colemanite, costing from five cents a pound upward according to the quantity which is purchased, will effectually prevent flies from breeding.

While it can be safely stated that no injurious action has followed the application of manure treated with borax at the rate of .62 pound for eight bushels or even larger amounts in the case of some plants, nevertheless borax-treated manure has not been studied in connection with the growth of all crops, nor has its cumulative effect been determined. It is therefore recommended that not more than fifteen tons of the borax-treated manure should be applied per acre to the field. As truck growers use considerably more than this amount, it is suggested that all cars containing borax-treated manure be so marked, and that public health officials stipulate in their directions for this treatment that *not over .62 (62/100) of a pound for eight bushels of manure be used*, as it has been shown that larger amounts of borax will injure most plants. It is also recommended that all public health officials and others in recommending borax treatment for killing fly eggs and maggots in manure warn the public against the injurious effects of large amounts of borax on the growth of plants. Purchasers of manure produced in cities during the fly-breeding season should insist that the dealers from whom they purchase give them a certified statement as to whether or not the manure in the particular car or lot involved in the purchase has been treated with borax.

In feeding to hogs garbage that contains borax, care is also recommended, especially when the animals are being fattened for market. Borax is not a very poisonous substance and the feeding of garbage that contains it to hogs, is not likely to be a serious matter. On the other hand borax in large quantities does produce gastric dis-

turbances and for this reason a certain amount of care is advisable.

The method for using this substance in the case of stables is to sprinkle the borax or colemanite in the quantities given above, by means of a flour sifter or other fine sieve, around the outer edges of the pile of horse manure. The manure should then be sprinkled immediately with two or three gallons of water to eight bushels of manure. It is essential, however, to sprinkle a little of the borax on the manure as it is added daily to the pile, instead of waiting until a full pile is obtained, because this will prevent the eggs which the flies lay on fresh manure from hatching. As the fly maggots congregate at the outer edge of the manure pile, most of the borax should be sprinkled there.

Borax costs five to six cents per pound in 100-pound lots in Washington, and it is estimated that at this rate it would cost only one cent per horse per day to prevent all breeding of flies in city stables. If calcined colemanite is purchased in large shipments, this cost should be considerably less. At the same time, if the borax is used on the manure only in the proportions stated, its value for use in the garden or for sale to farmers will not be lessened.

It is believed that this information will greatly help the health authorities in their campaign against the fly. The health authorities have long tried to prevent the breeding of flies in city stables through the use of iron sulphate as a larvicide. In the case of iron sulphate, however, a large amount is required, and other insecticides such as Paris green or potassium cyanide, while effective in killing the flies, are very expensive or extremely poisonous. Borax, which is used freely in most households, and is readily available in all parts of the country, has the advantage of being comparatively nonpoisonous and non-inflammable, readily soluble in water and easy to handle. It can be purchased at retail for ten cents a pound, and a single pound used as directed in a garbage pail or open toilet may prevent the breeding of hundreds of dangerous flies.

The details of the experiments with borax and other larvacides will be found in U. S. Department of Agriculture Bulletin No. 118.

Our Foreign-Born Population as a Factor In the Tuberculosis Problem.

"In an interesting paper presented at the annual meeting of the American Sanatorium Association last week, Dr. Walter Rathbun, Physician in Charge of the Otisville Sanatorium, called attention to the fact that out of 1,197,892 immigrant aliens admitted to this country at Ellis Island during the year ending January 30, 1913, only 38 were debarred on account of having tuberculosis. That this small number represents but a small fraction of immigrants actually tuberculous will hardly be doubted by any one familiar with the social aspect of this disease. Nor is the failure to recognize a larger number of infected individuals at all surprising in view of the very great number of immigrants to be examined and the wholly inadequate staff of examining physicians.

"The following sanatorium and hospital figures giving the proportion of alien patients in typical institutions may be of interest.

Bedford Hills Sanatorium, 84 per cent. foreign-born patients, most of them aliens.

Metropolitan Hospital, 51 per cent. foreign-born patients, 15 per cent. of them aliens.

Bellevue Hospital, 48 per cent. foreign-born patients, 25 per cent. of them aliens.

Riverside Hospital, 45 per cent. foreign-born patients.

Otisville Sanatorium, 42 per cent. foreign-born patients.

Seton Hospital, 39 per cent. foreign-born patients.

"The population of New York City includes 40 per cent. of foreign-born people. The proportion of foreign-born patients in the institutions mentioned above is considerably more than it should be. According to Dr. Rathbun, a stricter examination should be made of all immigrants on arriving, and in every instance the chest of these individuals should be examined by physicians skilled in the diagnosis of pulmonary tuberculosis. Dr. Rathbun suggests that the Federal Government appoint a commission of experts to study the situation and to outline a more thorough system of examination."

Bulletin of the New York City Department of Health, June 6, 1914.

Cleaning up and Staying Clean.

The Sanitary and Sociological Bulletin of the Colorado Fuel and Iron Company reprints in its April issue the following:

"The Pueblo Commerce Club has just issued the following ten commandments for a clean city. We take pleasure in recommending these commandments to our people and school children:

1. Thou shalt locate, report and abolish all public nuisances.

2. Thou shalt not spit on sidewalks or in any public place or conveyance.

3. Thou shalt remember that filth breeds flies, and that flies make funerals.

4. Thou shalt not sweep thy sidewalks in the business section after half past seven in the morning.

5. Thou shalt not throw tin cans or rubbish in any back yard, vacant lot or alley.

6. Thou shalt provide a covered receptacle for all manner of house and stable refuse.

7. Thou shalt gather and burn all sorts of combustible rubbish.

8. Thou shalt not haul refuse in leaky or overloaded wagons.

9. Thou shalt wage continual warfare on weeds, dandelions and untrimmed trees.

10. Thou shalt whitewash or paint thy buildings, and shalt keep thy premises constantly clean.

The school children should be especially interested in the clean-up campaign, and all will be asked to help make their surroundings clean and sanitary.

Property owners and others are invited to aid in this hygienic and health-protecting movement.

The smallest yard and ugliest fence may be made attractive with flowers and vines, but cleanliness is more essential than ornamentation. Do both."

Deaths Proved Not Due to Antityphoid Vaccine.

Along with the agitation against smallpox vaccination there has also been considerable discussion against antityphoid vaccination, particularly in the newspapers. The following statements taken from *The Journal of the American Medical Association* for June

13, 1914, seem to prove the fallacy of such statements.

"Dr. S. S. Goldwater, Commissioner of Health of New York City, has rendered a great service to medicine and the public by causing an investigation of deaths and severe illness reported in the newspapers as due to antityphoid vaccine. According to newspaper statements, Clarence E. Pantzer, a private in the National Guard of Brooklyn, died as a result of injection of antityphoid vaccine. The Army surgeons who made the inoculation claimed that the death was not due to this cause. After a protracted dispute, in which Health Commissioner Goldwater recalled a burial permit previously issued, an autopsy was performed under the direction of the coroner, which showed that death was caused by malignant endocarditis. No evidence of typhoid fever could be found in the post-mortem examination. In another instance, two children were inoculated with the vaccine, at the request of their father, who was at the time sick with typhoid. Marked and severe symptoms later occurred, which were immediately credited to the injection of the vaccine, and the statement was made that the children were suffering from blood poisoning. Thus, the following statement appeared in a number of newspapers simultaneously:

"While militiamen in many states of the west are being immunized against typhoid fever, two children in New York are near death as a result of typhoid serum injections. Their mother, brother, and aunt are recovering from an attempt to immunize them."

"In this instance, as well, Dr. Goldwater ordered a thorough investigation, and it has now been shown definitely that both children are suffering from typhoid contracted, without any doubt, prior to the administration of the vaccine. In one case, owing to the pressure of an accumulation of cerebrospinal fluid, the disease closely resembled the epidemic form of meningitis; thus confusing still further the symptoms and making very difficult the diagnosis. In speaking of these cases, Deputy Commissioner Emerson emphasized the fact that typhoid vaccinations were both harmless and efficacious. 'According to the department's records most of the

secondary or direct contact cases become infected while the physician is waiting for more definite symptoms in the original case. In the presence of any illness, even remotely suspected of being typhoid fever, prompt immunization of every member of the family is of great advantage. Those who develop the disease after immunization invariably show evidence of having contracted the infection before the immunizing injection."

Scarlet Fever in Shanghai.

"As regards scarlet fever, in no country has any marked impression been made on its incidence by ordinary sanitary measures. In England it remains almost as common as measles, and natural immunity, the result of this prevalence, has produced a mild type of the disease. As the infection is almost entirely personal, in addition to the ordinary public sanitary measures, there is required for its adequate prevention a high general intelligence on the part of the community. If this want of success is met with in countries having all the benefits of modern sanitation and education, what can be expected in a community such as Shanghai, made up of so many elements. An unfortunate factor also is the extreme virulence of the infection met with in China—scarlet fever in Shanghai is more than four times as deadly as it is in England; and there is no indication yet of a decrease in virulence.—*Shanghai Health Report, 1913, by Dr. Arthur Stanley, Health Officer.*"

Food Control at its Source.

"At the meeting of the National Civic Federation held in New York recently, Dr. Carl Alsberg spoke, by invitation, of the sanitary and hygienic control of foods. Dr. Alsberg's ideas as expressed at this meeting represent what might be regarded as the new thought in the pure food world. That is to say, instead of spending so much money on police work, he would economize by spending money for prevention. If the food manufacturers can be made to observe good sanitary and hygienic laws there will be little foodstuff on the markets for inspectors to seize.

"Dr. Alsberg said: 'There is but one need in food control which is so vastly more important than all others that I propose to urge it alone upon your consideration. It is adequate sanitary and hygienic control of food.

"By the sanitary and hygienic control of foods I mean the prevention of traffic in foods dangerous to health. To prevent this traffic is far more difficult than to prevent mere fraud in food products. Fraud may usually be detected by a chemical analysis. The danger to health that can easily lurk in a food can easily be detected in this way unless, indeed the food contain some simple poison like arsenic or lead. If, however, the food be manufactured in unsanitary surroundings, or if it be the bearer of tuberculosis, typhoid, measles or scarlet fever, this can hardly be detected. Hence, in my opinion, foods such as butter and milk, fish, and shellfish which are capable of this kind of contamination, should receive the greatest attention.

"The only safeguard against these sources of danger is inspection of the place of production and medical supervision of the workmen. It should be impossible, for example, for a dairyman with a case of typhoid fever in his family to ship milk.

"Obviously the exercise of such control of the sanitary conditions of food production is a task for the individual states. I would, therefore, urge upon you to secure such sanitary control of food production in every state. I can conceive of nothing more important.

"If such a sanitary control is to be established you must clearly understand that to be effective it must rest upon an adequate health service. Outside of our larger cities such a service is most unusual."

Bulletin, Dairy and Food Division, Pennsylvania Department of Agriculture, April and May, 1914.

Health Week, 1914.

"Health Week has become an important institution in England. Although it will not be held this year until the week beginning November 15, yet the committee on organization has already commenced activi-

ties and has issued a pamphlet giving helpful suggestions to those who will have charge of making local arrangements. The immediate purpose of Health Week is to make health, during the specified week, the chief topic of public concern. During the past two years the week has been observed in about seventy different localities, but a large increase over this number is anticipated this year. The responsibility for the central organization was transferred this year from the Agenda Club to the Royal Sanitary Institute, thus placing authority in the most responsible hands."

American City, June, 1914.

Effluvia as a Cause of Disease.

The old theory of noxious emanations as a cause of disease is with us again. This time however it has some basis of physiological reasoning but it is doubtful if we can admit that the odor of sewer air is sufficiently irritating to the tissues lining the throat to cause congestion and consequent predisposition to diphtheria. The following note is clipped from the *Medical Officer* of June 6:

"Dr. H. Cooper Pattin, M. O. H., includes in his annual reports charts exhibiting the varying incidence of diphtheria at Norwich, week by week, each year. He believes that these charts afford convincing evidence that any condition of the atmosphere, or of the surroundings, which tends to produce a congested condition of the tissues lining the throat—such as damp, foggy weather, particularly when associated with low barometric pressure which leads to engorgement and relative congestion of the superficial vessels; or any irritating influence—such as the noxious effluvia constantly given off by the contents of bins, pail-closets, sewer air, fish and other refuse, etc.,—distinctly favours the development of diphtheria."

Profitable Conversion of Garbage.

The July issue of *Municipal Engineering* has an interesting note from a London correspondent on a new method of garbage disposal which unfortunately tells more of

results than of the method itself. The article here quoted gives the impression that the action is rather magical.

"A method of garbage disposal which is finding considerable favor in England and which has been adopted amongst other towns in Southwark, Hove, Halifax, Blackpool, etc., consists in converting the house refuse collected by municipalities into a marketable fertilizer. The plant comprises a patent disintegrator or dust manipulator, a conveyor and an electric motor for driving. At Southwark, London, there are four sets of machinery which are erected in pairs, the two pairs facing each other, the conveyors conveying towards the center and discharging the output into a railway truck for immediate dispatch. The whole space occupied by the plant is only some 50 feet by 20 feet and no costly buildings are required. The machine which actually does the work is the dust manipulator which is a strong and powerful centrifugal force disintegrator. The dust carts tip their loads on a sheltered platform some 20 feet by 12 feet, where large tins and leather, which fetch a good price, are thrown aside by the workmen, while the remainder, including broken glass, crockery, slates, wood, and small tins, in one word, the whole of the unpicked refuse, is shovelled into the hoppers of the machine for treatment. In a second or two after entering the machine the house refuse finds its way out and falls on the conveyor in a uniform mass which cannot well be distinguished from dark, rich loam. Occasionally, a few very small bits of paper appear here and there on the surface, but these disappear very quickly owing to the disintegrating action of a rapid fermentation accelerated by the pounding the refuse received while passing through the machine. One very noticeable point is that immediately after treatment this mass, which previously had a most unpleasant smell, has entirely lost it and is not objectionable. The stuff thus treated is now ready to be spread at once on the soil as manure. Of the four dust manipulators at Southwark three are in constant use, one being kept in reserve and used when wanted. We understood that the output amounted to some 70

tons per day, and that the manure sold by the council to farmers and kitchen gardeners in Kent amounts to something like 18,000 to 20,000 tons per year. This manure is sold at 2s., 4d (56½ cents) per ton. Each machine is capable of treating up to 4 or even 5 tons of refuse per hour. The whole operation is performed in a manner cleanly, quiet, and free from any suspicion of nuisance, and the economical principle of giving back to the soil what comes from the soil is put into practice."

Bacillus Coli in Summer Diarrhoea.

"In the *Annali d'Igi ne Sperimentale*, Vol. 23, No. 4, 1913, De Blasi and Sampietro give particulars of researches carried out by themselves on the relation of *Bacillus coli* to summer diarrhoea. In a considerable portion of the cases of summer diarrhoea which they investigated *B. coli* was demonstrated to be present in pure culture. In others, more frequently than in normal faeces, non-lactose-fermenters were found; while in a few specific organisms, such as Morgan's bacillus, *B. dysenteriae*, type Y, etc., were found.

"The *B. coli* isolated from diarrhoeal stools were very virulent on inoculation subcutaneously or intraperitoneally into guinea-pigs, but were harmless when given by mouth to the same animals."

Public Health, June, 1914.

Public Health Administration and the Citizen.

"Public health administration in a community is as extensive, and the health department is as efficient, as the people want it to be. Health administration can neither exceed to any great extent, nor lag far behind the wishes of the people. An interesting illustration of this is the experience of the city of Wilmington, N. C., during the last two or three years. Two years ago public meetings were held in protest against the extension of public health work, while recently a mass meeting rallied to the support of the health department in opposition to the expressed intention of the majority of the city council to curtail the department budget."

Public Health Reports, June 12, 1914.

The Care of the Eyes in Measles.

If preventive medicine fails to stop the spread of measles it may at least help to prevent the blindness which may result, as the accompanying clipping from *The Medical Officer*, (Dec. 13, 1913) points out.

"Dr. A. T. Paterson, school ophthalmic officer to the Durham county council has pointed out in his annual report to Dr. Eustace Hill, C. M. O., that measles is the disease which, by the corneal opacities left in its train, ruins more eyes than all other causes (squint excepted) combined. 'It is at the same time,' he continues, 'the one cause that can most easily be guarded against. It is quite tragic to see week after week children with a large central corneal opacity spoiling the vision of one eye, and to be complacently told by the parent, "Oh, it was the measles that did it." A very serious responsibility rests upon the general practitioner for the loss of these eyes—either they do not sufficiently realize that next to broncho-pneumonia, the chief thing to watch in measles is the development of ulcerative conditions of the cornea, or else they do not sufficiently impress upon the parents the necessity of daily bathing the eyes of the child affected with a warm solution of boracic acid.' So strongly does he feel on this point that Dr. Paterson urges that the health department might, during epidemics of measles, send a circular to each medical practitioner in the area affected, pointing out the urgent necessity for instructing the parents as regards the care of the eyes during the course of the disease."

Royal Commission on Venereal Diseases.

At the eighth meeting of the Royal Commission on Venereal Diseases evidence was given by Sir William Thompson, Registrar-General for Ireland.

He said that as a cause of deaths venereal diseases played relatively a small part in Ireland. The death-rate from syphilis and allied diseases was 0.78 per 10,000 of the population, whereas the figures for tuberculosis, the head of the list, were 21.52 per 10,000.

Compared with previous years the deaths from syphilis and general paralysis of the

insane appear to show a tendency to increase, but Sir William Thompson thought that much of the increase was more apparent than real, and was due to the more careful recording of deaths.

The greater part of the deaths from venereal diseases occurred in the two cities, Dublin and Belfast. In Dublin the figures were abnormally high, the death-rates from syphilis and general paralysis of the insane being about twice those for London.

On the whole the incidence of venereal diseases in Ireland was very much lower than in the rest of the United Kingdom; the syphilis death-rate was only that of England and Wales, while with regard to infant mortality the number of deaths due to syphilis per 1,000 births in the three Kingdoms were England and Wales 1.29, Scotland 1.4, Ireland 0.59.

The Medical Officer, January 3, 1913.

Canadian Public Health Association.

The Canadian Public Health Association will meet this year on the 10th, 11th and 12th of September, in the twin cities of Port Arthur and Fort William.

The programme so far contributed promises to be the most interesting and useful the association has yet enjoyed.

Some of the leading features are the "Review by the Canadian Expert in Charge of the International Waterways Investigation as to the Extent of the Pollution of the Inland International Waters," of the findings and their significance. This takes up the first morning. Prof. John Amyot will contribute this matter. Experts from both sides of the line will take part in the discussion.

A symposium on the undesirable immigrant will take up the last morning of the session. Contributors are Prof. Dean Clarke, University of Toronto; Dr. Page, Quebec; Louis Kon, Winnipeg; Dr. MacMurchy, Toronto; Dr. Copeland, ship surgeon S.S. *Hesperian*, and others.

The section of engineers and bacteriologists have every new phase of treatment of water and sewage contributed by Mr. Geo. Fuller, consulting engineer, New York; Prof. Brydone Jack, Winnipeg; Dr. Naismith, Toronto; Mr. Dallyn, sanitary engineer, Toronto, and others.

The section of militia and transportation medical men have a programme extremely useful to any practitioner.

The section of medical inspection is practical from a scientific point as well as the administrative and financial side. Papers have been obtained by men of acknowledged standing along lines desired by the local committee.

The section of social workers has a most interesting and broad programme provided by full time experts working in the service in Winnipeg and other centres. Mr. Ihlder, of the National Housing Association, of New York, is one of the contributors.

The section of sanitary inspectors, meat and food inspectors, have contributions by such men as Tustin Haig, of Winnipeg; Watson, of Regina; Wilson, of Toronto, and Dr. Rutherford, of Calgary.

Two evening meetings will be held, addressed by Hon. Mr. Hanna and Prof. Hill of London.

PERSONAL NOTES.

The following persons were elected to membership in the American Public Health Association, July 30, 1914:

Harry Young Carson, Allston, Mass.
George FitzHugh Catlett, Wilmington, N.C.
Carl D. Geidel, Madison, Wis.
Nathan Q. Gorter, M.D., Baltimore, Md.
Morton Franklin Sanborn, Albany, N. Y.
Josephine Sanquirit, Fall River, Mass.
Nelson C. Scudden, M.D., Rome, N. Y.
John Henry Wright, New York, N. Y.

Twelve sanitary supervisors have been appointed to the State Department of Health of New York and they have already entered upon their duties, except Dr. Samuel D. Hubbard, New York City, who resigned. The department feels very much gratified that it has obtained the services of men whose past work has so fully qualified them for the important duties of this office. The appointments are as follows:—

Dr. Edward Clark, Buffalo. Dr. Clark

established the milk bureau of Buffalo and was Deputy Commissioner of Health from 1888 to 1890. He was appointed a member of the Public Health Council in 1913 and resigns to become Sanitary Supervisor.

Dr. Frederick W. Sears, Syracuse. Dr. Sears is health officer of Syracuse, appointed in January, 1913. He was Professor of Histology and Pathology in Syracuse Medical College, 1886-94, and health officer of Syracuse 1895-98. He has served on various public health committees for many years.

Dr. Harry H. Crum, Ithaca. Dr. Crum has been health officer of Ithaca since 1903. He established the first medical inspection of schools in Ithaca.

Dr. John J. Mahony, Jamestown. Dr. Mahoney has been health officer of Jamestown for eight years. He represented the Department this spring in investigating the smallpox epidemic in Chautauqua county.

Dr. Frank Overton, Patchogue. Dr. Overton is health officer of Patchogue and a lecturer on public health topics. He is the author of "Applied Physiology" for schools. He has been Secretary of the Suffolk County Medical Society since 1905 and was President of the State Sanitary Officers Association for two years.

Dr. Charles S. Prest, Waterford. Dr. Prest has been health officer of his village for eleven years. He is Chairman of the Legislative Committee of the New York State Sanitary Officers Association and resigns the position of Assistant Secretary of the Hospital Committee of the State Charities Aid Association to become Sanitary Supervisor.

Dr. LeRoy W. Hubbard, Mt. Vernon. Dr. Hubbard was appointed Medical Inspector of the Department of Health, New York City in 1897. In 1898 he was assigned to the Diagnosis Laboratory remaining there for eight years. He was Assistant Director of the Division of Communicable Diseases, Borough of Bronx, 1902-1910.

Dr. John Archibald Smith, Saranac Lake.

Dr. Smith is milk inspector of Saranac Lake and Bacteriologist of the Saranac Lake Board of Health, and was the author of the present milk ordinance.

Dr. John A. Conway, Hornell. Dr. Conway is health officer of Hornell and has done special work in the Tuberculosis campaign. He has studied sanitary methods in both England and Scotland.

Dr. Charles C. Duryee, Schenectady. Dr. Duryee as health officer of Schenectady revised the Sanitary Code of that city and also organized the first municipal dispensary for tuberculosis in the State outside of New York City. He organized the first mayor's conference which was devoted entirely to the subject of public health in 1910.

Dr. Charles V. Patchin, Dansville. Dr. Patchin has been health officer of the town of Dansville for thirty years. He has had large experience in diagnosis, quarantine and control of contagious diseases. He has also been active in the agitation for the prevention of the adulteration of milk.

Dr. Dewitt C. Gilles, of Washington, D. C., on the staff of the Bureau of Animal Industry, United States Department of Agriculture, has been appointed Chief Food Inspector for the Board of Sanitary Commissioners, Savannah, Ga. This appointment was made as the result of a competitive examination held by a Board of Examiners in Savannah, Ga., Washington, D. C., Boston, Mass., and Chicago, Ill. Dr. Gilles secured the highest grades in veterinary pathology and bacteriology, in food inspection, and secured a high rating for education and experience. This examination was noted in an editorial in the JOURNAL for April, 1914.

Dr. Walter Bapty, who has been serving as acting secretary of the Provincial Board of Health of British Columbia, has received the appointment in the place of Dr. C. J. Fagan, who resigned. Dr. Fagan has acted as secretary to this board for many years.

INDUSTRIAL HYGIENE AND SANITATION

Occupational Fatigue.

In the June issue of the *Journal of State Medicine*, Sir Thomas Oliver contributes an article on "Occupational Fatigue" in which he makes a study of the various causes of fatigue in working people. This has several points of interest.

The author enumerates various causes of fatigue and the results as follows:

"(1) Night work for women and children.

"(2) The employment of young persons in arduous processes requiring the lifting and carrying of heavy weights beyond their strength and years. This is not only a cause of fatigue but of arrested physical development.

"(3) The question of age, generally, and its relation to output.

"(4) Too long hours and working overtime.

"(5) Work in continuous processes as carried on in iron and steel works. It is pointed out that work, if interrupted, promotes physical development.

"(6) Speeding up and the increased rate at which machinery is run in textile factories.

"Quite apart from the speeding-up of machinery in textile factories, the exhausting effects of working in warm, humid atmospheres deserves attention. Dr. Pembrey of Guy's Hospital, and Dr. Collis of the Home Office have reported upon this subject. 'In a warm, moist atmosphere the pulse quickens, the skin becomes flushed and warm, and the temperature of the mouth rises, approaching to the internal temperature which is raised to a smaller extent.' At work, weavers in cotton mills are on their feet all day; in watching the machines they are obliged to cover a good bit of ground daily, but this exercise is not sufficient to produce an unusual rise of temperature. Warm, moist temperatures reduce the differences between the internal temperature and that of the peripheral parts, and tend to establish a more uniform temperature of the body generally, and to throw a tax upon the powers of accommodation, as witness the low blood pressure. Muscular work raises the internal

heat, and up to a certain point this is an advantage to the worker. But if the air is hot and moist, more blood is sent to the skin to be cooled and unless perspiration can take place there can be little or no reduction of temperature. This sending of more blood to the skin to be cooled, imposes more work upon the heart and makes demands upon the nervous system to regulate its distribution. Carried on under good conditions, work improves the appetite and keeps the bodily functions healthy; but a warm, moist skin in a humid atmosphere lessens the tone of the muscles, lowers the exchange of material in the body and depresses the appetite, hence the complaint of many cotton weavers who are pale, slim and short in stature, of loss of appetite, indigestion and fatigue. It is prolonged exposure to warm and humid atmosphere which creates the indisposition textile workers complain of. It would hardly appear, therefore, as if to the factory worker training and experience gave anything like the resistance which these give to the muscles, heart, and nervous system of the athlete who is exercised in the open air, partly because in the factory there are such adverse circumstances in operation as impure air, moist, warm atmosphere, noise and the speeding-up of machinery.

"(7) Upon alcohol as a cause of fatigue, time will not allow me to dwell, nor upon

"(8) The influence of noise, imperfect lighting, and

"(9) Dusty atmospheres.

"(10) Of poverty as a cause of fatigue it is hardly necessary to speak. To supplement his scanty earnings the worker is obliged to whip up his ill-nourished muscles to an extent far beyond their capability, without his having the means to obtain an adequate supply of food to replace the wear and tear the work has caused.

"A glance at the industrial progress of the second half of last century shows that while the actual physical burden imposed upon workers has in many instances been light-

ened, the greater use of labour-saving machinery has not only induced a degree of eye strain and of muscular monotony, but has necessitated a fixation of mental attention far beyond anything hitherto required. When to these is also added the burden imposed upon the system generally by breathing a vitiated atmosphere, there is created a sense of fatigue of a deeper type than that which followed the hard manual labour of a bygone age. The nervous system is more profoundly affected."

Early Diagnosis of Lead Poisoning.

In the June 6, 1914, number of the *Journal of the American Medical Association*, Dr. Harry Linenthal of the Massachusetts General Hospital, Out-patients' Department, has an interesting article on the "Early Diagnosis of Lead Poisoning" from which he draws the following conclusions:

"The reporting of occupational diseases is a public health measure. Early diagnosis of these diseases is essential both to protect the worker from the more serious effects of the industrial poisons and to gather information as to the prevalence of these diseases.

"In the diagnosis of plumbism, the most frequent of occupational poisoning, there is in many quarters a tendency to give too much emphasis to the presence of the lead-line or basophilic degeneration of the red cells. While the presence of these signs is often of great aid in the diagnosis of obscure cases of non-industrial origin, their absence should not prevent a diagnosis when certain symptoms characteristic of early plumbism manifest themselves, more particularly when a history of exposure to contact with lead can be obtained.

"The history of exposure is the all-important aid in the diagnosis, and careful inquiry should be made by the physician as to the details of the patient's work, and he should not be satisfied with a general designation which may not give any indication of exposure to lead."

Lawful Matches.

"On July 1, 1913, both the manufacture and sale of matches containing white phosphorus were brought to an end in this

country. On that date the act which Congress recently passed, imposing a prohibitive tax on matches in which this substance is used, became a law.

"This law was enacted only after years of agitation which made the public aware of the terrible effects produced on the operatives in match factories. The disease contracted by the workers in match factories is commonly termed 'phossy jaw.' Just at the present time we have a very good example of the ravages of this dreadful disease in Illinois. Elizabeth Nemanich of Joliet was employed by the National Match Company, of Joliet, where she became a victim of 'phossy jaw.' She has submitted to three operations and now wears an artificial silver jaw. A few days ago she was awarded the paltry sum of \$3,050.

"Since the passage of the act referred to above, it has been discovered that there are other forms of phosphorus not of a poisonous nature. Phosphorus is obtained from bones, which consist mainly of phosphorus and lime chemically combined with each other and with organic matter. Two most commonly seen forms of phosphorus are the white, which is poisonous, and the red, which is practically harmless.

"Under the new law only two kinds of matches will be in use, the 'safety match,' which ignites when scratched on a specially prepared surface, and the 'bird's eye match,' which can be ignited on any dry surface.

"The main ingredient of the 'safety' match is chlorate of potash, while the surface on which it is to be lighted is painted with red phosphorus. The substance used for the tip of the 'bird's eye match' is sesquisulphide of phosphorus, a compound of comparatively harmless nature. A temperature of over 300° F. is required for igniting these matches. They cannot be ignited through being stepped on, they do not spark or fly, and are not explosive."

Illinois Factory Inspection Bulletin.

Safety First as a Branch of Health Work.

"The Safety First Campaign is a timely movement along lines for the saving of human lives, and as a preventive measure

deserves the hearty support and coöperation of every citizen. But even a casual study of the accidental deaths of the year would indicate that there is a broader field for the work of the safety propaganda than along the generally accepted lines; also that the educational side of the movement should be carried into every home and workshop in the city, to the end that the Safety First idea should become firmly implanted in the minds of our citizens, as a dominant factor of their lives all the time."

Bull. Chicago School of Sanitary Instruction, May 16.

Practical Results with Ventilation Systems.

In the monthly bulletin of the *American Museum of Safety* for June, 1914, Mr. D. D. Kimball, chairman of the section on ventilation and heating, cites some interesting facts relating to the increase of efficiency of workers due to good ventilation. There is not very much data obtainable of actual experiments made upon the efficiency of ventilation systems, but interesting facts may be obtained from the following results that have been collected by Mr. Kimball, which show that good ventilation has a marked effect on the decrease of sickness.

"The Germania Insurance Company of New York, in 1910, had eighty clerks in one office. Previous to the proper ventilation thereof, 10 per cent. were absent on account of illness all the while. Since then, absenteeism has been reduced practically to nothing.

"The vice-president of the Manhattan Trust Company of New York states that by proper ventilation he has so increased the efficiency of his clerical force that he has been able to reduce the number of employees 4 per cent.

"The records of the United States Pension Bureau show that when the offices of the department were located in scattered and poorly ventilated buildings, 18,736 days were lost by employees through illness in one year and about the same number for several successive years. When the department became established in new, well-ventilated quarters, the loss was reduced to 10,114 days'

absence on account of illness, although the working force was much larger.

"In the printing establishment of Mr. C. J. O'Brien, in New York, a ventilation system was installed because of the insistence of the State Department of Labor that the law be complied with, the order having been resisted for two years. After the system had been in use a year the proprietor stated that had he known in advance of the results to be obtained, no order would have been necessary to have brought about the installation. Whereas, formerly, the men had left work on busy days in an exhausted condition and sickness was common, now the men left work on all days in an entirely different condition, and sickness had been very much reduced. The errors in typesetting and time required, for making corrections were greatly reduced."

Industrial Conditions.

In *Public Health Reports* for May 29, 1914, Dr. B. S. Warren, of the United States Public Health Service, and Sanitary Adviser to the United States Commission on Industrial Relations, has a very stimulating and instructive article on Industrial Conditions and Their Relation to Public Health. In introducing the subject, he says that in the study of methods for the prevention of disease, investigators have found that many of their problems are industrial and economic and that success in disease prevention very largely depends upon the proper adjustment of the industrial relations of employer and employee upon a basis that will permit both to live according to hygienic standards.

In order to bring about this adjustment and bring powerful aid to those influences already working for industrial betterment, the Public Health forces should coöperate heartily. Often it is found that the effects of industrial conditions extend to entire communities and are in a large part indirectly responsible for slum districts, alley dwellers, and low standards of living. From current published reports it is easily to be seen that industrial conditions, particularly relating to industrial hygiene and sanitation, are not what they should be.

The author believes that in order to make

any headway in disease prevention in the industries, the following four points at least be carried out.

1. Hours of labor which do not cause excessive fatigue or cause damage to any part of the body.

2. Regular employment at a wage sufficient to meet the cost of hygienic living and insure against sickness or other physical disability.

3. Sanitary environment in the place of employment.

4. Education as to methods of hygienic living and the importance of such living.

He does not place the responsibility for existing conditions of environment entirely upon the worker. One can not always choose his own environment. This will continue to be true, especially in the unskilled groups, so long as the supply of laborers is greater than the demand, and the competition for employment makes it possible for the employer to fix the terms of employment. The responsibility must rest mainly on the employer, but the state must do its part. The following list of hygienic requirements, outlined according to where the responsibility lies, seems to be of sufficient value to quote entire.

A. Employers' Responsibility

1. Mental and physical fitness of employees. Physical examination prior to employment, and periodically thereafter.

2. Wages.

- (a) Adequate to maintain the employees as to (1) proper food, (2) clothing, (3) hours for rest and recreation, and thereby maintain an efficient and healthy mind and body.

- (b) Increase or promotions according to length of service to provide for family and increase in family.

- (c) Adequate to save for old age or pay for old-age pension.

3. Place of employment.

- (a) General sanitary conditions, (1) proper heating, (2) proper humidity, (3) proper lighting, (4) no overcrowding, (5) proper ventilation, (6) proper cleaning, (7) clean water supply.

- (b) Special dangers, (1) substitute harmless or least dangerous material for use of

dangerous material whenever practicable, (2) safe handling of dangerous material by mechanical devices, etc.

- (c) Removal of dust, gases, and fumes.

- (d) Safeguarding against accidents.

- (e) Equipment necessary for personal hygiene, (1) washing facilities, (2) toilets (3) rest rooms, (4) lockers, etc.

4. Mental and physical energy expended.

- (a) Hours of labor, (1) length of work day, (2) overtime, (3) night work.

- (b) Fatigue; (1) rest, recreation, and sleep necessary to eliminate waste and restore body cells prior to beginning day's work; (2) posture, speed of work or attention required, which causes unusual strain to be eliminated where practical, or adequate rest periods to be allowed; (3) monotony of occupation as cause of fatigue.

5. Age and sex of employees.

- (a) No child labor under 14 years.

- (b) No night work for women, young people, or children.

6. Compensation for sickness and accident incident to employment.

7. Regular employment in so far as practicable.

8. Medical supervision by company physician.

- (a) Prompt medical and surgical aid.

- (b) Sanitary inspections.

- (c) Elimination in an equitable manner of the mentally and physically unfit.

9. Contributor to sick insurance fund.

10. Education of employees.

- (a) Prevention of disease.

- (b) Prevention of accidents.

- (c) Special rules for dangerous processes.

B. Employees' Responsibility.

1. Home environment.

- (a) General sanitary condition as to (1) heating, (2) humidity, (3) lighting, (4) overcrowding, (5) ventilation, (6) cleanliness, (7) clean water supply.

- (b) Special sanitary condition.

- (c) Personal hygiene, obtain proper (1) food, (2) clothing, (3) bathing, (4) rest, (5) recreation and avoidance of dissipation.

2. Places of recreation.

- (a) General sanitary conditions.

- (b) Special sanitary conditions.

- (c) Personal hygiene, no dissipation.
- 3. Regular employment.
 - (a) Seek employment.
 - (b) Prompt attendance.
- 4. Procuring medical and surgical relief in case of sickness or accidents.
- 5. Contribution to sick insurance fund.
- 6. Education.
 - (a) Prevention of sickness.
 - (b) Prevention of accidents.
 - (c) Special rules for dangerous processes.
 - (d) Study to increase efficiency and fitness for promotion or increase in pay.

C. State Responsibility.

- 1. Housing—home, shops, places of amusements, etc.
 - (a) Sanitary building regulations.
 - (b) Special regulations governing sanitation.
 - (c) Sanitary inspections.
 - (d) Licensing of dangerous trades.
 - (e) Personal hygiene requirements.
- 2. Regulations of hours of labor.
 - (a) Day and night, to prevent exhaustion.
 - (b) No night work for women, young persons, or children.
 - (c) No child labor under 14 years.

- (d) Overtime to be eliminated where practicable.
- 3. Minimum wage scale.
- 4. Medical supervision.
 - (a) Free hospitals for indigents.
 - (b) Dispensaries for indigents.
- (c) Regulations governing medical attendance in certain industries.
- 5. Pure-food regulations.
- 6. Pure water supply.
- 7. Special measures to prevent disease.
- 8. Regulation of social insurance or compulsory sick and old age insurance.
- 9. Education of those concerned.

Education in Personal Hygiene for Employees.

"The one thousand women employees of the Emporium, a large San Francisco store, are given instruction in various phases of general hygiene, including lectures on sex hygiene. They are divided into groups of sixty-five each, one class each day. The course includes also lectures on dietetics, food values, care of the feet, care of the teeth and other branches."

Physical Culture, April.

CURRENT PUBLIC HEALTH LITERATURE.

AMERICAN.

Albany Medical Annals.

- XXXV, No. 5. May.
Bender Hygienic Laboratory. H. S. Bernstein.
XXXV, No. 6. June.
Medical Inspection and Examination of School Children. P. V. Winslow.

American Journal of Medical Sciences.

- CXLVII, No. 6. June.
Examination of One Hundred Painters for Evidence of Lead Poisoning. E. R. Hayhurst.

Archives of Internal Medicine, Chicago.

- XIII, No. 6. June.
Attempts to Produce Scarletina in Monkeys. C. Krumweide, J. S. Pratt.
German Measles: An Experimental Study. A. F. Hess.

Boston Medical and Surgical Journal.

- CLXX, No. 26. June 25.
Function of Social Service of Psychopathic Hospital, Boston. M. C. Jarrett.

Engineering Record.

- LXX, No. 1. July 4.
Imhoff Tanks to Increase Capacity of Baltimore's Sewage Treatment Plant. L. C. Frank.
Test of San Francisco Garbage Incinerator.
Covers for Sprinkling Filters.
Improving the Water Supply of Galveston, Texas.
LXX, No. 2. July 11.
Cost of Cleaning and Repairing Weston Aqueduct.
Underdrain Experiences at Kansas City, Kan.
LXX, No. 3. July 18.
Removal of Carbonic Acid, Iron and Manganese from Lowell Well-Water Supply.
New York State's Policy on Problems of Water and Sewage.

Journal of Infectious Diseases, Chicago.

- XIV, No. 3. May.
Colon Group of Bacteria. L. A. Rogers, W. M. Clark, and B. J. Davis.
New Method of Determining Relative Stability of Sewage Effluents. A. Lederer.
Comparison of Plating and Microscopic Methods in Bacteriologic Examination of Milk. G. W. Goodrich.

Journal of Medical Research, Boston.

- XXX, No. 2. May.
Leprosy: Flies in Relation to Transmission of Disease. J. A. Honeij and R. R. Walker.

Journal of the American Medical Association, Chicago.

- LXII, No. 26. June 27.
The Service of Medicine to Civilization. V. C. Vaughan.

- The Treatment of Tetanus by Antitoxin. E. E. Irons.
History of a Typhoid Carrier. M. P. Ravenel.

LXIII, No. 1. July 4.

- Supposed Poisonous Properties of Chestnuts Grown on Trees Affected with Chestnut Blight. C. D. Marsh.

LXIII, No. 2. July 11.

- Influence of Hookworm Disease on the Eyes. J. W. Jervey.
State Insurance Against Sickness. R. A. Allen.

LXIII, No. 3. July 18.

- Experiments on the Curative Value of the Intraspinal Administration of Tetanus Antitoxin. W. H. Park and M. Nicoll.

New York Medical Journal.

- XCIC, No. 25. June 20.
Alein in Relation to Spread of Acute Infectious Disease. L. L. Williams.
Antituberculosis Campaign. J. Rosenburg.

Ohio State Medical Journal, Columbus.

- X, No. 6. June.
What Are Practical Health Measures? Who should Lead and Why? O. Dowling.

Public Health Reports.

- XXIX, No. 26. June 26.
The Etiology of Pellagra—The Significance of Certain Epidemiological Observations with respect Thereto.
What Is a Safe Drinking Water?

XXIX, No. 27. Ju'y 3.

- Plague Reported in New Orleans.
Cancer: Is It on the Increase?
Court Decisions Relating to Morbidity Reports.
The right of the Community to Require Physicians to Report Cases of Disease Coming Under Their Observation and the Purposes thereof and Reasons Therefor as Stated by Courts of Last Resort.

XXIX, No. 28. July 10.

- Plague in New Orleans.
Biological Products. Establishments licensed for the Propagation and sale of Viruses, Serums, Toxins and Analogous Products.
Trachoma. A Survey of its Prevalence in the Mountain Sections of North and South Carolina.
The Notifiable Diseases. Their Prevalence by States During 1913. Supplement No. 12 to Public Health Reports.

Surgery, Gynecology and Obstetrics, Chicago.

- XVIII, No. 6. June.
Educational Value of Cancer Statistics to Insurance Companies, Public and Medical Profession. F. L. Hoffman.

FOREIGN

Berliner Klinische Wochenschrift.*LI, No. 20. May 18.*

Behring's Method of Vaccinating Against Diphtheria. E. V. Behring and R. Hageman.
 Effect of Compressed Air. A. Bornstein.

Bulletin de l'Academie de Medicine, Paris.*LXXVIII, No. 20. May 19.*

The Bacteriological Concept of the Field of Tuberculosis. F. Bézancón.

LXXVIII, No. 21. May 26.

Antityphoid Vaccination of Personnel of Paris Hospitals. Mesurer.

LXXVIII, No. 23. June 9.

Principles of a Method Designed to Diminish Contagiousness of Communicable Diseases Through the Air of Sick Rooms. T. Trillat.

Correspondenz Blatt für Schweizer Aerzte, Basel.*XLIV, No. 20.*

Typhoid Epidemic in Zurich District. R. Frey.
 The Gaitre Problem. T. Dieterle, L. Hirschfeld and R. Klinger.
 Postmortem Findings in Paratyphoid Infection.

Deutsche medizinische Wochenschrift, Berlin.*XL, No. 22. May 28.*

Latent Tuberculosis in Children. H. Kleinschmidt.

XL, No. 23. June 4.

Diphtheria Combatting and Diphtheria Prophylaxis. W. Braun.

Lancet, London.*No. 4737. June 13.*

Aerial Conveyance of Infections. F. H. Thomson and C. Price.

No. 738. June 20.

Hygienic Aspect of Coal Mining Industry in United Kingdom. F. Shufflebotham.

Medical Officer, London.*XI, No. 25. June 20.*

Risks of Smallpox in View of the Declining Vaccination Returns of This Country. A. K. Chalmers.

XI, No. 26. June 27.

Canadian Children Under School Age. H. McMurphy.

XII, No. 1. July 4.

Sanitation in India.

A Juvenile Psychiatric Clinic. R. Hughes.

Medizinische Klinik, Berlin.*X, No. 20. May 17.*

Nature of Whooping-Cough and Conditions in regard to Contagion. A. Feer.

Presse Medicale, Paris.*XXII, Nos. 46-48.*

Milne's Method of Treatment in Scarlet Fever and Measles. M. N. Wilboushewitch.
 Etiology of Scarlet Fever. H. Roger.

Public Health Journal, Toronto.*No. 6. June.*

Transmission of Typhoid. H. W. Hill.
 Sunlight in Cities. T. Brockmann.
 Housing Problem. E. W. J. Hague.
 Economic and Racial Waste Through Insanitary Homes and Workshops. T. M. Molloy.
 Town Planning and Its Influence on Public Health. A. L. Favell.
 Veterinary Hygiene and Public Health. C. H. Higgins.

Journal of Pathology and Bacteriology, London.*XVIII, No. 4. April.*

Investigation Concerning Dohle's Leukocytic "Inclusion Bodies" in Scarlet Fever and Other Diseases. W. MacEwen.

Riforma Medica, Naples.*XXX, No. 16. April 18.*

Typhoid Bacilli Can Often Be Cultivated from the Mouth Early in Typhoid. E. Mondolfo.

Semana Medica, Buenos Aires.*XXI, No. 15.*

Sanitary Regulation of Railroad Transportation.

AMERICAN JOURNAL OF PUBLIC HEALTH

A REPORT OF A CHEMICAL AND BACTERIOLOGICAL STUDY OF WRAPPED BREAD.

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INTRODUCTION.

The question of wrapped bread is receiving wide attention. Sanitarians are discussing the desirability of having a law passed which will compel bakers to wrap their bread before such product can be offered for sale. This agitation has been taken up most eagerly by club women and others interested in clean foods. The bakers have discussed this subject at their meetings, the views expressed varying from extreme pro partisan to those absolutely opposed to the public's meddling with the bakers' business. Conferences with bakers have been held at which it has repeatedly been shown that the cost of wrapping bread need not be much over 5 per cent. (sometimes less), whether the bread be wrapped by hand or by machine. Experimental work done by Barnard and Bishop,* and by Ott,† has shown that wrapped bread loses no more than 7.6 per cent. of water in 7 days, while unwrapped bread may lose as much as 17.3 per cent. and that wrapped bread was in good condition at the end of 72 to 96 hours, while at the end of three days the unwrapped bread was hard, dry, and unsalable. The National Association of Master Bakers has found this subject of such importance as to spend several thousand dollars in having a public analyst carry on research work on this subject and to make a report thereon. In this report there is nothing to show that in 48 to 72 hours wrapped bread had lost any of its flavor, texture, freshness, palatability, or other factors which go to make up quality of bread. The fact that bakers continually have so many "stales" returned should incite an investigation which might help to prevent this economic waste.

*Indiana State Board of Health Report, 1910.

†Kansas State Board of Health, Sixth Biennial Report, 1912.

If wrapping of bread can satisfy the public in its desire for clean food, and if the cost to the baker and the public be not prohibitive, and further if it can help to do away with the return of "stale bread" and will at the same time maintain the loaf in a good condition as regards flavor, texture, palatability, freshness, etc., it is a most desirable result to achieve.

While these questions have already been studied, the Bureau of Chemistry has decided to make an investigation of wrapped bread which would take up other phases of the subject.

The experiments thus undertaken and reported herein were begun for the purpose of determining: First, the kind of paper best adapted for wrapping bread; second, the lapse of time necessary after the bread was baked before wrapping; third, bacteriological data regarding wrapped and unwrapped bread; and fourth, the relative weights of wrapped and unwrapped bread. Two bakeries coöperated with the Bureau in this work. These will be designated as Bakery No. 1, and Bakery No. 2. Nine kinds of paper presenting the greatest difference in quality, as determined by thickness, waxing, or porosity, were selected from a large variety of samples submitted. Mr. Veitch, chief of the Leather and Paper Laboratory of this Bureau assisted in this selection.

Bread wrapped and unwrapped was also purchased in a number of retail stores for bacteriological examination.

METHOD OF PROCEDURE IN BAKERIES.

Approximately twenty loaves of bread were placed in a steel rack immediately after being removed from the oven. Into three of these loaves thermometers were inserted. Readings on these thermometers were taken immediately and at intervals of 1, 2, 3, 4, and 5 hours after removal from the oven. The temperature of the room was noted at the same time. After the bread had been out of the oven for one hour, three loaves were weighed, wrapped and set aside. This was repeated at intervals of one hour for five hours. Three loaves were also weighed on removal from the oven and in periods of 1, 3, and 5 hours in the bakery and allowed to remain unwrapped. When the loaves were removed from the oven, one loaf was wrapped in sterilized parchment paper while hot and carried to the laboratory for bacteriological examination. All the wrapped bread remained in the bakery exposed over night and was delivered to the laboratory the next morning by one of the regular delivery wagons from the bakery. With this bread three loaves of wrapped and three loaves of unwrapped, stale bread of the day before were also delivered.

METHOD OF PROCEDURE IN LABORATORY.

Bread from Bakery No. 1: On arrival in the laboratory one loaf from each wrapping after 1, 2, 3, 4, and 5 hours, respectively, after removal from the oven, was unwrapped and weighed. A bacteriological sample

was taken of those loaves which were 1 and 5 hours old when wrapped. Weights and bacteriological samples were also taken on the fresh unwrapped and on the stale wrapped and unwrapped bread which had been delivered. At this point the bread was 18 hours old. When the bread was twenty-four hours old another set of five samples was weighed and examined and when 42 hours old the last set of loaves was weighed and examined.

Bread from Bakery No. 2: When this bread arrived in the laboratory it was divided into two groups, one being placed in a glass case of the same type as those used in grocery stores for keeping bread and the other was allowed to remain in the laboratory exposed. All this bread had been exposed over night and was 18 hours old on reaching the laboratory. It was allowed to remain until it was 42 hours old before being weighed. It was possible to work at this bakery 'ut one day, and therefore only three kinds of paper, which were, however, very different from one another, were used.

DISCUSSION OF RESULTS OBTAINED FROM BAKERY NO. 1.

It will be seen from Table I that the bread wrapped in paper (1), which was waxed on both sides, showed a very small loss in moisture and that the loss did not increase very materially from 18 to 42 hours. In the case of paper (2), which was not a waxed paper, the loss in weight did not increase progressively with the time, but was greater than the loss obtained with paper (1). The bread in paper (3), waxed on one side, showed a higher loss than that in paper (1), but a much smaller loss than in paper (2). Paper (4) was also waxed on both sides and the bread enclosed therein showed a small loss; papers (5) and (6) were not waxed but were very thin and supposedly impervious. Samples (1) to (6), inclusive, were held in a glass case throughout the whole period from 18 to 42 hours. The last three samples, (7), (8), and (9), held in trays and unconfined in any way, showed a gradual increase in the loss of moisture. This increase in loss was reflected on the character of the crust of the bread. The crust from those samples which showed the lowest loss of moisture was soft and moist, while that from the samples having the highest loss of moisture was firm and dry. The firmness of the crust of all the bread so far as could be determined was directly proportionate to the loss in moisture. *The odor and flavor of all the samples were normal. No foreign flavor or disagreeable odor could be detected in any of the samples of bread throughout the whole period of 42 hours.*

From Table II it will be noted that those samples which were held in the glass case lost less moisture than those which were held exposed. It may also be noted that the loss of all the bread shown in this table is greater than that shown in Table I, the average loss here being 9.11 per cent. when the bread was 42 hours old, while, in Table I, the average for the bread of the same age is 2.16 per cent.

From Table III it will be seen that the average weight of the fresh wrapped bread from bakery No. 1 is 13.29 ounces, while that of the fresh unwrapped is 15.43 ounces. This shows a difference of 13.9 per cent. in weight or in other words the consumer pays 13.9 per cent. more for bread wrapped than for the same kind of bread unwrapped, both having been made from

TABLE II.

RESULTS OF EXPERIMENTS ON SAMPLES OF UNWRAPPED BREAD COLLECTED FROM BAKERY NO. 1 SHOWING THE PERCENTAGE LOSS IN WEIGHT AFTER COOLING FOR CERTAIN PERIODS OF TIME.

Weight in ounces while hot.	Percentage of loss in weight of bread per loaf after					
	1 hr.	3 hrs.	5 hrs.	18 hrs.	24 hrs.	42 hrs.
<i>Four loaves held in glass case for 42 hours</i>						
Maximum.....	2.63	3.34	3.70	6.26	6.61	7.33
Minimum.....	1.12	1.98	2.51	4.61	5.10	6.50
Average.....	1.52	2.53	2.99	5.20	5.76	6.94
<i>Two loaves held in glass case over night</i>						
Loaf No. 1.....	2.31	2.90	3.57	6.18	6.63	9.75
Loaf No. 2.....	2.36	2.98	3.75	6.31	6.73	9.78
<i>Three loaves held exposed for 42 hours</i>						
Maximum.....	1.82	2.43	2.88	6.13	8.64	11.82
Minimum.....	1.57	2.14	2.60	5.79	8.41	11.62
Average.....	1.66	2.29	2.75	5.97	8.53	11.72

TABLE III.

COMPARATIVE WEIGHTS OF WRAPPED AND UNWRAPPED BREAD.

	Bakery No. 1.				Bakery No. 2.	
	Fresh.		Stale.‡		Fresh	
	Wrapped.*	Un-wrapped.†	Wrapped.	Un-wrapped.	Wrapped.§	Un-wrapped.‡
Maximum.....	14.47 oz.	16.23 oz.	13.39 oz.	14.90 oz.	14.94 oz.	15.99 oz.
Minimum.....	11.66 oz.	14.32 oz.	12.05 oz.	13.69 oz.	13.14 oz.	14.62 oz.
Average.....	13.29 oz.	15.43 oz.	12.66 oz.	14.09 oz.	14.19 oz.	15.34 oz.
Average difference	13.90%		10.15%		7.50%	

* 135 loaves weighed.

† 100 loaves weighed.

‡ 9 loaves weighed.

§ 45 loaves weighed.

dough having the same moisture content. The cost of wrapping, under the conditions which now prevail at bakery No. 1, was estimated to be approximately 6 per cent. The superintendent of this bakery stated that although the wrapped bread was being made smaller than the unwrapped, the consumer was asked to pay *only one-half the cost of wrapping, or 3 per cent.* It appears that the consumer instead of paying 3 per cent. for wrapping is paying on the average 13.9 per cent. for this desirable change.

This table also shows an average difference of 10.15 per cent. between the stale wrapped and unwrapped bread. This loss is lower than that found in the same kind of fresh bread and is due to the fact that the stale unwrapped loaves lost moisture more rapidly than the stale wrapped bread.

Table IV shows that the bread cooled very rapidly the first hour in both bakeries, but that it did not reach the temperature of the room in five hours. The wrapping in bakery No. 1 is commenced approximately two hours after the bread leaves the oven. The bread has not then reached the normal temperature of the room; therefore, when the bread is wrapped the moisture which comes to the surface is prevented from evaporating by the impervious wrapper. This accumulated moisture softens the crust, although the flavor and odor of the bread are not affected in any way which could be detected.

TABLE IV.

CHANGE OF TEMPERATURE IN INTERIOR OF LOAF AS OBSERVED DURING EXPOSURE FOR FIVE HOURS.

Bakery.	Temperature of room.	Length of time bread was exposed before temperature was recorded.					
		2 minutes.	1 hour.	2 hours.	3 hours.	4 hours.	5 hours.
No. 1..	23.4°C.	98.3°C.	43.4°C.	32.8°C.	28.8°C.	26.9°C.	25.9°C.
No. 2..	30.0°C.	97.9°C.	49.4°C.	34.9°C.	30.4°C.	29.8°C.	27.7°C.

DISCUSSION OF RESULTS OBTAINED FROM BAKERY NO. 2.

It will be seen from Table V that the bread wrapped in paper (1), which was waxed on both sides, showed an average loss when 42 hours old of 0.44 per cent.; that in paper (3), waxed on one side, showed an average loss of 0.95 per cent., and that in the parchment paper (2), which was not waxed on either side, showed an average loss of 4.42 per cent. The loss increased progressively with the age of the loaf but was always highest in those loaves wrapped in parchment paper and always lowest in those loaves wrapped in the paper having both sides waxed. Here again, as in Table I, the relative losses in the weight were noticeable on the character of the crust of the bread. The crust from the bread wrapped in paper (2) which

RESULTS OF EXPERIMENTS ON SAMPLES OF WRAPPED BREAD COLLECTED FROM BAKERY NO. 2, SHOWING THE PERCENTAGE
 . LOST IN WEIGHT AFTER COOLING FOR CERTAIN PERIODS OF TIME.

[illegible]

* Lost.

showed the highest loss of weight was the firmest and driest, while that from the bread wrapped in paper (1) was soft and moist. The odor and flavor of all the samples were normal, and nothing disagreeable was to be detected in any of the samples throughout the whole period of 114 hours. That wrapped bread undergoes a greater loss in moisture when exposed than it does when confined in a glass case is also shown.

It will be seen from Table VI that the loss in weight progresses with the age of the bread.

It will be noted from Table III that the wrapped bread from bakery No. 2 has an average of 14.19 ounces, while the unwrapped bread shows an average of 15.34 ounces, or a difference in favor of the unwrapped bread of 7.5 per cent. When this difference is compared with that obtained in Table III from bakery No. 1, which was 13.9 per cent., it is seen that although bakery No. 2 is charging the consumer all it costs to wrap the bread, it is not trying to discourage wrapping by making an added profit out of it.

TABLE VI.

RESULTS OF EXPERIMENTS ON SAMPLES OF UNWRAPPED BREAD COLLECTED FROM BAKERY NO. 2 SHOWING THE PERCENTAGE LOSS IN WEIGHT AFTER COOLING FOR CERTAIN PERIODS OF TIME.

Loaf Number.	Weight in ounces while hot.			Percentage of loss in weight of bread per loaf after being exposed					
	1 hr.	3 hrs.	5 hrs.	1 hr.	3 hrs.	5 hrs.	42 hrs.	90 hrs.	42 (con- fined 48 hrs.).
1.....	13.74	13.49	13.33	1.82	2.98	3.42	7.79		
2.....	14.34	14.19	14.14	1.44	2.47	2.82	6.60		
3.....	14.22	13.98	13.81	1.69	2.88	3.16	7.60		8.93

BACTERIOLOGICAL EXAMINATION.

The bacteriological examination of the bread was made of the outside of the loaf only. A thin portion of the crust was removed with a sterile knife from the top, bottom and two sides of the loaf—those parts which are evidently most frequently touched during handling. About 8 sq. cm. of the crust were removed, placed in sterile weighing bottles, weighed and shaken with nine times its weight of sterile water and with sterile shot for twenty minutes. The liquid was then examined and results recorded according to the methods recommended by the American Public Health Association.* One cc., 0.1 cc., and 0.01 cc.† were plated upon nutrient

*Standard Methods for the Examination of Water and Sewage, 2nd edition by American Public Health Association, 1912, pp. 76-136.

†These dilutions were used because they are at present accepted by the American Public Health Association as the most satisfactory in determining the bacterial contents of substances. It will be understood, however, that results thus obtained are only relative and that no attempt is made at present in practical work to determine accurately the total number of individual organisms present in original samples.

agar,* incubated for four days at 25°C. and 37°C., and upon wort agar,† incubated for four days at 25°C. Inoculations were also made into tubes of dextrose fermentation broth,* lactose bile,* and shake cultures in dextrose agar,‡ all of which were incubated four days at 37°C.

From the lactose bile tubes, which showed gas, isolations were made by plating upon MacConkey's bile salt agar,§ and identification made of organisms of the *B. coli* type by growth upon ordinary kinds of differential media, including Russell's double sugar agar.||

RESULTS OF BACTERIOLOGICAL EXAMINATION.

The results of the examination of samples of wrapped and unwrapped bread collected in bakeries Nos. 1 and 2 and from various retail markets in Washington follow:

TABLE VII.

RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF UNWRAPPED, FRESH BREAD COLLECTED FROM BAKERIES.

	Number of organisms per gram developed after 4 days' incubation on:				
	Nutrient agar at		Wort agar at 25°C.	Dextrose shake agar at 37°C.	
	25°C.	37°C.			
			Four loaves, fresh from the oven.		
Maximum	80	70	50	30	
Minimum	10	less than 10	less than 10	less than 10	
Average	42	37	15	7	
		Three loaves, cooled five hours in bakery.			
	Maximum	5,200	7,900	900	800
	Minimum	170	130	60	200
Average	2,823	3,476	593	400	

No gas-producing organisms found in bile or dextrose fermentation broth inoculated with 0.1 gram quantities.

Molds developed on wort agar from all loaves cooled in bakery.

Gas-producing organisms developed in dextrose shake agar from all loaves cooled in bakery.

See footnote () page 728.

†John W. H. Eyre, M. D., The Elements of Bacteriological Technique, 2nd edition, 1913, p. 176.

‡Ibid., 1913, p. 225.

§Ibid., 1913, p. 205.

||Russell, F. F., The Isolation of Typhoid Bacilli from Urine and Feces with the Description of a New Double-Sugar Tube Medium. (Reprinted from the *Jour. of Med. Research*, Vol. 25, No. 1.)

TABLE VIII.

RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF BREAD WRAPPED
IN PAPER OF KNOWN QUALITY.

Kind of paper used for wrapping.	No. of organisms per gram developed after 4 days' incubation on:			
	Nutrient agar at		Wort agar at 25°C.	Dextrose shake agar at 37°C.
	25°C.	37°C.		
Cooled one hour in bakery before wrapping.				
(1) White F. F., waxed both sides	400	440	360 20 molds	300
(2) Unwaxed parchment, 25 W.	70	140 10 molds	70 molds	1 mold
(3) White F. F., waxed one side	700 300 molds	270	1,000 molds	(a)
(4) Tattoo amber, No. 5 B	500	340	1,500 molds	400
(5) Bison Glassine 20	30	80	240	(a)
(6) Bison Grease-proof 20 . .	110 1,600 molds	110	1,400	40*
(7) One side waxed, No. 31	20	30†	50	40*
(8) Both sides waxed, No. 18	70	100	100 molds	(a)
(9) "A" Fibre	20	90	90 molds	90*
Cooled five hours in bakery before wrapping.				
(1) White F. F., waxed both sides	250 50 molds	330	130	100
(2) Unwaxed parchment 25 W.	240 20 molds	90	50 20 molds	50
(3) White F. F., waxed one side	20	10	30 30 molds	(a)
(4) Tattoo amber No. 5	36,000	28,400†	12,500 400 molds	50,000*
(5) Bison Glassine 20	30 40 molds	50 30 molds	300 500 molds	60*
(6) Bison Grease-proof 20 . .	300 200 molds	170	80 40 molds	70*
(7) One side waxed, No. 31	70	50†	20 molds	40
(8) Both sides waxed, No. 18	30	70†	40	20
(9) "A" Fibre	480	390	70 40 molds	500

* Gas-producing organisms found in dextrose shake agar inoculated with 0.1 gram quantities.

† Gas-producing organisms found in bile fermentation tubes and dextrose broth tubes inoculated with 0.1 gram quantities.

(a) No visible growth in 0.1 gram quantities.

It will be seen from Table VII that the crust of bread is practically sterile when it is removed from the oven, but after being allowed to remain exposed in the bakery it may collect a large number of bacteria on its crust. It may be noted, however, that no organisms of the *B. coli* type were found in 0.1 gram quantities of this bread.

It will be noted from Table VIII that the bread which was cooled one hour before wrapping has a higher number of molds than that cooled five hours. The samples showing the greatest number of molds are samples (3), (4), (6), and (8). The paper used for these samples was waxed on one or two sides. In this table sample (4) has been omitted because of its abnormally high count, suggestive of faulty manipulation in examination.

TABLE IX.

RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF BREAD COLLECTED FROM RETAIL MARKETS.

	Number of organisms per gram developed after 4 days' incubation on:				Number of molds per gram developed after 6 days' incubation on wort agar at 25°C.
	Nutrient agar at		Wort agar at 25°C.	Dextrose shake agar at 37°C.	
	25°C.	37°C.			
	Twenty-nine loaves of unwrapped bread.				
Maximum.....	7,000	5,500	10,000	7,000	1,600
Minimum.....	190	70	110	40	20
Average.....	1,917	1,186	1,105	864	482*
	Twenty-eight loaves of wrapped bread.				
Maximum.....	900	190	500	300	500
Minimum.....	20	20	less than 10	less than 10	10
Average.....	136	80	81	44	82†

* Twenty-three loaves showed growth of molds.

† Eighteen loaves showed growth of molds.

Gas-producing organisms found in bile and dextrose fermentation tubes inoculated with 0.1 gram quantities from eighteen loaves of unwrapped bread.

Gas-producing organisms found in bile and dextrose fermentation tubes inoculated with 0.1 gram quantities from two loaves of wrapped bread.

Table IX shows the result of the analysis of 29 samples of unwrapped bread and of 27 samples of wrapped bread purchased in various retail markets. It may be seen that the average counts in the various media as shown in the latter is much lower than the corresponding average counts shown in the former.

Sixty-two per cent. of the samples of unwrapped bread showed organisms of the *B. coli* type in 0.1 gram quantities, while only 7 per cent. of the wrapped bread showed the presence of these organisms.

These two tables show clearly the actual conditions in which consumers receive wrapped and unwrapped bread.

CONCLUSIONS.

From the experiments herein reported the following conclusions may be drawn:

First, the kind of paper used for wrapping bread controls, to a large extent, the loss in moisture sustained by the bread. Paper waxed either on one or both sides causes the bread wrapped within it to retain its moisture longer than pervious paper. It is therefore evident that in the case of breads whose crusts are to be kept comparatively firm and dry, such, for example, as Vienna and French breads, porous paper, having no wax on either side, may be best. For the ordinary type of bread none of the paper used showed detrimental results.

Second, the time necessary before bread may be wrapped may be established at approximately three hours, as this was the time at which the bread reached approximately the normal temperature of its surroundings.

Third, the relative weights of wrapped and unwrapped bread showed that in these experiments with two bakers the unwrapped bread is from 7.5 to 13.9 per cent. greater than the wrapped bread, this reduced weight of the wrapped bread having a tendency to discourage its use in the home. In view of the facts, brought out by many conferences with bakers who wrap bread, that the cost need not greatly exceed 5 per cent. (if indeed it even reaches this figure), there should be no justification on the part of the baker to reduce the weight of wrapped bread to the extent of 7.5 to 13.9 per cent.

Fourth, that unwrapped bread shows signs of becoming stale sooner than wrapped.

Fifth, so far as could be detected by organoleptic tests there was nothing objectionable developed in wrapped bread in a period of 114 hours.

Sixth, bread as it comes from the oven has a practically sterile crust.

Seventh, bread which was cooled only one hour before wrapping retained heat and moisture enough to favor the growth of certain organisms, especially when paper waxed on one or both sides was used.

Eighth, bread may become contaminated with organisms while cooling in the laboratory; therefore, it should be wrapped as soon as it is sufficiently cooled.

Ninth, the surface of wrapped bread purchased from retail markets was more nearly free from organisms than unwrapped bread obtained at the same time from the same sources, and fewer loaves of this wrapped bread showed the presence of organisms of the *B. coli* type.

WHAT THE STATES AND CITIES OF THE UNITED STATES ARE DOING IN PUBLIC HEALTH EDUCA- TION WORK.

HORACE GREELEY, M. D.,
Brooklyn, N. Y.

Anyone who has attempted to gather from as wide an area as the United States data on a subject in regard to which probably no two officials pursue the same plan will appreciate the difficulties of classifying the varied and vacillating practices in publicity work of the health authorities of its various sections.

After gathering what information I could, I found that for purposes of comparison it would be necessary to take the only fairly common activity, namely the bulletin issued; and in classifying these I obtained the information shown on table on next page.

From the above we can see that nearly one half of the states (23) have at least recognized the need of popularizing and advertising their health work, although from perusing the material offered in their bulletins one would judge that at least two thirds of these pamphlets must fail of their object, yet since nearly all of the popular features are of but recent development, the outlook is most promising for the principle once inaugurated, stimuli that popular appreciation and requirements are sure to supply, will insure the needed improvement. It is apparent that not enough time and attention is given to the preparation of most of these publications, since it is rare to find material given in either timely, consistent or attractive form. What usually presents is a jumble of tables and charts with here and there, "Swat the fly," "Nurse your baby," or "Get vaccinated." Sometimes some good intentioned contributor adds an article on how to avoid tuberculosis by holding the shoulders up, or how to keep in good health by taking as many cold baths as opportunities offer, and although advice such as the first is only deceptive, the second could, if followed out by the average seeker for health, do great injury.

Of course, we all understand that the reason behind all of these failings is the lack of provision to either remunerate the health authorities for the necessary editorial work, or even to meet the cost of printing an attractive bulletin. Still, as I have said, the health officers are beginning to understand that publicity is the only way in which that public appreciation may be obtained which alone can secure even the living wage which they have so long been denied, and it is this realization which insures steady improvement in these publications despite all obstacles.

BULLETINS OF STATE HEALTH DEPARTMENTS.

Appearance.	Statistics only.	Statistics and technical information.	Statistics and at least some popular material.
Monthly.....		Alabama	
Quarterly.....		Arizona	
Monthly.....		California	
Monthly.....			Connecticut
Monthly.....			Florida
Quarterly.....			Georgia
Irregularly.....			Idaho
Monthly.....		Illinois	
Monthly.....		Indiana	
Monthly and Quarterly.....			Iowa
Monthly.....			Kansas
Monthly.....			Kentucky
Monthly.....			Louisiana
Bimonthly.....			Maine
Monthly.....		Maryland	
Monthly.....		Massachusetts	
Monthly.....			Michigan
Monthly.....		Minnesota	
Irregularly.....			Mississippi
Quarterly.....			Missouri
Monthly.....		Montana	
Quarterly.....		New Hampshire	
Monthly.....			New York
Monthly.....			North Carolina
Monthly.....			North Dakota
Monthly.....		Ohio	
Quarterly.....			Oklahoma
Monthly.....		Oregon	
Monthly.....			Pennsylvania
Monthly.....		Rhode Island	
Monthly.....			South Carolina
Monthly.....			South Dakota
Monthly.....			Texas
Quarterly.....		Utah	
Monthly.....		Vermont	
Quarterly.....			Virginia
Monthly.....		Washington	
Quarterly.....			West Virginia
			Wisconsin

No periodical bulletins are issued by either Arkansas, Delaware, Colorado, Nebraska, New Jersey, Nevada, New Mexico, Tennessee, or Wyoming.

One might expect that the most attractive bulletins were issued in the northeastern states, but the contrary is the case, and the very fact that some of the southern and western states have done so much better shows that merit here has not depended upon superior state organization or popular demand so much as on the capacity and enterprise of the particular officers.

The predominating topic in most of the bulletins is baby welfare, after which comes the house fly, vaccination, typhoid, tuberculosis contagion in general and in particular; especially local problems such as hookworm disease. Patent medicines are rarely attacked directly, and venereal diseases are avoided. Food, clothing, and housing are occasionally considered.

In addition to the regular bulletin many departments (35) issue special pamphlets on similar subjects in extension.

About half of the popular prints are supplied with illustrations, commonly placed on the outside of the back cover, some few of which are excellent, but most are extremely crude, and even those in cartoon style are usually too complicated. Proper clothing for the baby in winter and in summer, the fate of the unvaccinated, and common events in the career of the fly are some of the subjects.

Of the cities of the country with a population of over 20,000 (of which there are some hundred and ninety), the table on the following two pages is a classification of those bulletins which I have been able to obtain.

These bulletins, of which it is shown twenty-six out of fifty-nine are intended to be of a popular nature, are very similar to those issued by the states, although there is a very much greater per cent. of excellence among them, resulting, undoubtedly from the more intimate contact of the city official with his constituents, and probably also from his greater permanence in office and independence. Apart from these considerations the greater advance to which health work in general has of necessity been pushed within the cities has had its effect.

As an illustration of how a freely distributed health pamphlet may equal in attractiveness a popular magazine, the *Milwaukee Healthologist* is a good example, possessing even an illuminated cover. No one would ever think of throwing such a pamphlet unread into the waste-basket along with the congressman's last speech and a dusty report of the highways commission.

A more direct, more economical and more thorough way of reaching the mass of the public is undoubtedly through public press bulletins issued regularly from the health office; "healthgrams," as some of the officers call them. This method is not at all extensively pursued; so far as I have been able to ascertain, not more than ten of both states and cities given in the foregoing tables as yet employ it. Of course irregularly issued state-

BULLETINS OF CITY HEALTH DEPARTMENTS.

Appearance.	Statistics only.	Statistics and technical information.	Statistics and at least some popular material.
Monthly			Asheville, N. C.
Monthly	Auburn, N. Y.	Baltimore, Md.	
Monthly			Birmingham, Ala.
Monthly	Bridgeport, Conn.	Brockton, Mass.	
Monthly			Buffalo, N. Y.
Weekly			Chattanooga, Tenn.
Monthly			Chicago, Ill.
Weekly		Cincinnati, O.	
Weekly	Concord, N. H.		Detroit, Mich.
Monthly			
Monthly	Dubuque, Ia.		Duluth, Minn.
Monthly			El Paso, Tex.
Monthly	Galveston, Tex.		
Monthly	Grand Rapids, Mich.		
Monthly	Hartford, Conn.		
Monthly	Houston, Tex.		
Monthly	Johnstown, Pa.		
Monthly			Kansas City, Mo.
Monthly			Knoxville, Tenn.
Monthly	Lincoln, Neb.		
Monthly			Los Angeles, Cal.
Monthly			Louisville, Ky.
Monthly	Lynchburg, Va.		
Monthly	Lynn, Mass.		
Monthly			Memphis, Tenn.
Monthly			Milwaukee, Wis.
Monthly	Minneapolis, Minn.		
Monthly			New Haven, Conn.
Monthly	Newport, R. I.		
Monthly	New Orleans, La.		
Monthly		New Rochelle, N. Y.	
Monthly and Quarterly		New York, N. Y.	
Monthly	Petersburg, Va.		
Monthly			Philadelphia, Pa.
Monthly			Portland, Ore.
Monthly	Portland, Me.		
Monthly			Pueblo, Col.
Monthly			Richmond, Va.
Monthly			Rochester, N. Y.
Quarterly			Rockford, Ill.

BULLETINS OF CITY HEALTH DEPARTMENTS.—*Continued.*

Appearance.	Statistics only.	Statistics and technical information.	Statistics and at least some popular material.
Monthly	Roanoke, Va.		
Monthly	Sacramento, Cal.		
Monthly			St. Louis, Mo.
Monthly	St. Paul, Minn.		
Monthly			Salem, Mass.
Monthly			Salt Lake City, Utah
Monthly	San Antonio, Tex.		
Monthly	San Diego, Cal.		
Monthly	San Francisco, Cal.		
Monthly	Shreveport, La.		
Monthly			Spartenburg, S. C.
Monthly	Spokane, Wash.		
Monthly			Syracuse, N. Y.
Monthly		Tacoma, Wash.	
Monthly		Troy, N. Y.	
Monthly	Washington, D. C.		

ments to the press are very common, but the systematized feeding of timely and attractively prepared literature is just beginning. New York state papers take, to the number of some four hundred, a weekly bulletin, sent out on "boiler plate," while the Wisconsin journalistic pride scorns such, demanding the privilege of adding both local color and newspaper individuality to all matter issued.

A good many cities and a few states have had health exhibits, mostly non-official, *i. e.*, with some society's help, and of temporary duration, but in a few instances permanent exhibits have been prepared and circulate. One plan most suited for entirely rural communities, adopted by California, Colorado, Michigan, Tennessee and Louisiana, is to fit up a railroad car, or cars, to accommodate the charts and models, and also the personnel, and to make scheduled tour of the state, giving demonstrations and lectures at each stop. Another, being followed by New York just now, is to send special exhibits, baby welfare, and rural sanitation (pure water and milk methods) around to the county fairs and other public gatherings. Wisconsin has planned an elaborate series covering many of the commoner health problems.

There seems to be no systematized lecture course under the auspices of any of the health authorities, although as in New York state, lecturers are often supplied on special occasions and on request, and are usually drawn from the department's staff. New York city is planning an especially elaborate course.

Moving pictures are coming to the fore in demonstrative work, both as being suitable to mix with the public's pleasures where the greatest number are surest to be reached, and as appealing to that sense which of all we

possess is the least easily fatigued. One or two departments have undertaken their use but are greatly hampered by lack of suitable reels, which will, undoubtedly, eventually be prepared to order.

All practically have made more or less use of hand bills, or circulars of instruction, in routine work, and some few have displayed special posters in cartoon form, "horrible example," and otherwise. For this the Chicago bureau is most famous.

Following the lead of social betterment societies the Rhode Island State Department of Health in 1910 issued three circulars on sex-hygiene, one for young men and one for young women, and a third giving advice to sufferers from venereal disease. Last year the New York State board did likewise and engineered some lectures on the subject, held under the auspices of women's clubs, where circulars were distributed; but neither lectures nor prints have yet reached their objective—the youth of the community. This year and last Oregon appropriated \$10,000 to aid the work of a sex-education society coöperating with the health board, and a general campaign of lectures, exhibits and circular distribution has been in progress.

The New York city authorities, in order to meet some of the quacks on their own soil, have advertised their venereal disease advice-clinic in daily papers, in barrooms, and in public toilets, where "lost-manhood" and similar advertisements are usually found.

Five or six almanacs, prepared by various states, have appeared. They give, besides the usual information, much excellent seasonable and general advice and could be extensively imitated with good results.

I have searched in vain to find a parallel to that book, so popular with some classes, commonly called "The Family Doctor," as it has seemed that something similar, prepared by the health authorities, in an attractive form, might serve as a permanent guide to a household. The nearest approach is an admirable little book, bound in green cloth with ornamental back, such as would retail for about a dollar, which has recently been issued by the health department of the state of Indiana for free distribution to the mothers of the state. It is entitled "The Indiana Mothers' Baby Book."

Turning to the pamphlets issued by the United States Public Health Service, which are undoubtedly intended to serve to educate the public along these lines, while they are of the greatest excellence generally, they are more what a lay student of the particular subject could use than suitable for that portion of the populace that must read while it runs. They are also most unattractively printed. This is also true of the Department of Labor bulletins.

I shall close without further comment than to say that it seems to me that that portion of this work which makes the least demand for special attention from the public is that which will be productive of the best results, and this is the newspaper bulletin, the special home-advice book, and the part-educational moving-picture show.

THE POTTERY INDUSTRY AND ITS RELATION TO TUBERCULOSIS.

H. R. M. LANDIS,
Philadelphia, Pa.

Read before the American Climatological Association, June 19, 1914.

That there is a growing interest in regard to the effect which occupation may have on the health of the working men and women of this country is evidenced by the numerous laws relating to industrial hygiene, which are being introduced yearly in the various state legislatures. If, however, we except the successful crusades which have been waged against lead and phosphorus poisoning, most of the remedial legislation has been directed towards the minimizing of accidents and very little has been done towards correcting evils which have a remote rather than an immediate evil effect on the health of the worker.

Within the past year or so, twenty-one potters employed in the several manufacturing establishments at Trenton, New Jersey, have been sent to the White Haven Sanatorium by the Local Union of the National Brotherhood of Operative Potters. My interest in the occupation was aroused, partly because a number of these men were assigned to my service and partly because of the fact that, as a group, the manifestations of their disease differed somewhat from those encountered in other patients who had much less involvement of the lungs.

Etiology. The manufacture of pottery in the United States is largely centralized in two places, namely, Trenton, N. J., at which place the manufacture of sanitary ware is the chief product, and East Liverpool, Ohio, where the major part of the output is confined to white ware. These two cities represented 41 per cent. of the total value of pottery products for the United States in 1909.

The total number of people employed in the pottery industry of this country is about sixteen thousand, and approximately five thousand of this number live in Trenton, New Jersey. (Mortality Statistics, Tenth Annual Report, Census, 1909.)

The term "potter" is a very comprehensive one, and is ordinarily understood to mean any workman employed in a pottery. It is to be borne in mind, however, that the occupation is one "having many departments between several of which no common characteristics can be said to exist. This holds true of the two principal departments, viz., (1) the making of articles from potter's clay, and (2) their ornamentation by painting and gilding." (Arlidge, *Hygiene and Diseases of Occupation*, 1892.)

A brief description of the process of the manufacture of earthenware is essential to a correct understanding of the risks to which the working men are exposed.

The initial process consists in mixing the clay with ground flint and water. This is very dusty work but requires only a few men. Formerly the mixing was done by hand; at the present time machinery is almost universally employed. After the mixing process is completed the resulting product, known as "slip" is passed through sieves, at high pressure, in order to expel as much of the water as possible.

The wet clay is then ready to be shaped into various articles, such as plates, cups, pitchers, etc., and sanitary ware. The men employed in the fashioning of articles by hand are known as pressers. Those making flat articles, such as plates, are known as jigger-men. The pressers are

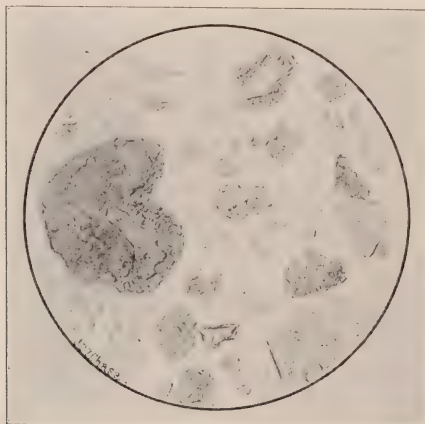


Fig. 1. Dust which is produced in "towing" or smoothing the ware. It is the same kind of dust that is produced from pulverizing the dried raw material, only finer. A small amount of flint enters into the composition.

more skilled as they fashion the hollow ware such as cups, pitchers, etc., by hand, while the jigger-men make plates and other flat ware by machine. Both are exposed to the dust which arises from the lumps of wet clay which fall about them and eventually become dried out and pulverized. Most of the sanitary ware is made from molds composed of plaster of Paris; the dust from the latter being added to the clay dust.

After the various articles have been made from the wet clay they are set aside to dry out. The surfaces of the articles when dry are always more or less rough and uneven to the touch, and this roughness is removed by placing the hollow ware on a lath and the flat objects on a rapidly revolving disk, and rubbing them with tow or flannel. This completes the work of the pressers and jigger-men, and is known as "towing." The dust which is

produced in this process is shown in Figure 1. After the required smoothness is obtained the ware is ready for the kiln.

The first firing is known as "biscuiting." The ware to be fired is placed in large thick-walled vessels, much the shape of a large cheese, and made of coarse clay. These vessels are known as "saggers." Into these the ware to be fired is placed, the different pieces being separated from each other and packed about with ground flint dust. This dust is pure white, very gritty to the feel and when inhaled is very irritating. A drawing of pure flint dust is shown in Figure 2. Because of its irritating qualities, manufacturers have tried, at different times, various substitutes. Nothing, however, has as yet been discovered which can replace the flint for the reason that all the materials tried contain impurities. These impurities, by reason of the high temperature to which the ware is subjected in the



Fig. 2. Flint dust after being fired in the kiln with the ware. The kilnmen and girls cleaning the ware in the china potteries are exposed to it.

kiln (1800 to 2000° F.), are driven into the ware and thus ruin it because the stains cannot be removed or concealed.

After the ware to be fired is placed in the "saggers," the latter are placed in the kiln and are built up tier upon tier until the kiln is filled. In addition to exposure to the flint dust the men who handle the "saggers" are exposed to alternating heat and cold from passing from the outside to the interior of the ovens, if recently heated. In addition there may be some sulphur fumes.

In the absence of precautions a tremendous amount of dust is present in the air of the work rooms. Lemaistre (quoted by Oliver in *Dangerous Trades*) from an analysis of the air in the Limoges potteries found the air in some of the workshops to be composed of earthy particles, fragments of granite, flint, particles of dried glaze, soot and wood charcoal. The

atmosphere in which the porcelain makers generally worked was found to contain six hundred and forty million particles of dust to the cubic meter.

After the first firing or biscuiting, the ware is ready to be glazed and, in the case of articles which are ornamented, to be painted or imprinted by colored transfers. The ware is then ready for a second firing which is carried out as in the first instance.

The final process consists in chipping off the uneven projections on the under side of the plates, cups, etc. The ware is then sorted and is ready to be packed in barrels as required for shipment.

While the question of lead poisoning does not belong properly to the subject matter of this paper, some mention of it is necessary for a complete understanding of the subject. After the first firing, the fired clay or biscuitware is dipped into a liquid mixture containing lead (15 per cent.). This process is known as glazing and the men who perform the work are called

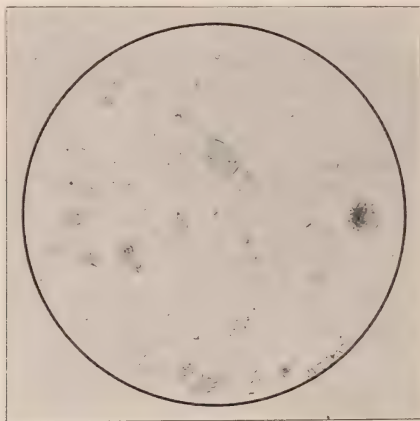


Fig. 3. Dust which contains a little lead. The dippers and kilnmen are exposed to it.

“dippers.” In carrying out this process the worker has both hands and forearms immersed in the liquid almost constantly throughout the working day.

After the ware has been dipped in the glazing fluid it is set aside in a drying room until it dries, usually a matter of twenty-four hours. During this time a certain amount of the liquid drips off and rapidly dries.

For many years it was thought that the dippers were poisoned by the lead because of having their hands and arms immersed in the glazing fluid. It is now known that there is no absorption through the skin, but that the real danger lies in the swallowing of dust containing lead. (See Figure 3.) So long as the glazing material is in a liquid state or the dried material is not broken up into fine dust, there seems to be no danger, if in addition the workman is cleanly about his person.

Although lead poisoning is still unduly prevalent among the English potters it seems to have been eliminated entirely among the American workmen. This has been accomplished by the simplest of precautions. Not only is the dipper cleanly as to his personal habits, but in addition two rooms are used for the freshly glazed ware which is being dried. Before a room which has contained the freshly glazed ware is used a second time it is flushed out with a hose, and furthermore no one is allowed to walk about in the room and break up the dried glazing material on the floor.

Several of the dippers to whom I talked had been employed in this branch of the work over twenty years, without any ill effects. From them I learned that in former years it was the belief among the workmen exposed to the danger of lead that poisoning could be prevented if they got sufficiently drunk every Saturday night to bring on vomiting. This they thought eliminated any lead that might have accumulated during the week.

The following table shows the different departments in which the twenty-one workers were employed:

Presser	8
Dishmaker ("jigger-man")	4
Kilnman	3
Dipper	1
Foreman (formerly mouldmaker)	1
Laborer	2
Unknown	2
<hr/>	
Total	21

In addition to the working environment other etiological factors undoubtedly play a part in producing ill health among these workers. In former times, bad hygienic conditions prevalent among the English potters unquestionably had a strong determining influence in the production of disease. The marked reduction in both the mortality and morbidity rates among English potters is probably due in part to improved living conditions. Arlidge (Paper presented at the Social Congress, Leeds, Oct., 1871), the leading authority on the diseases met with in potters, in a paper contributed nearly fifty years ago, ascribed much of the high incidence of respiratory diseases among the potters of North Staffordshire, England, to the damp climate, unhealthy shops and habitations, defective sewage disposal and drainage, improper diet and vicious habits.

G. Calvert Holland (Diseases of the Lungs from Mechanical Causes), in a monograph on the respiratory diseases encountered among the employees of the various cutlery establishments at Sheffield, England, also emphasizes the influence of poverty, drinking and poor sanitation. In his opinion there is a distinct relation between intelligence and the duration of life. In other words, the workman with intelligence enough to protect

himself during the actual conduct of his work and who, in addition, will observe the ordinary rules of hygienic living at home will counteract the risks of his employment much better than the careless or ignorant workman.

In this connection I might mention that in a recent visit to the Trenton potteries I saw several men who had contracted tuberculosis from two to three years ago. After their return from the sanatorium, with their disease arrested, they had returned to the pottery and had continued well. This could probably be ascribed to two causes, first, they took the best of care of themselves outside of working hours, and, secondly, they were extremely clean in the performance of their work.

While I have no personal knowledge of the home hygiene of the workers I had under observation, it is somewhat significant that eight of the twenty-one admitted the excessive use of alcohol.

The relationship which exists between wages and ill health is one of the burning questions of the day, and there are not a few who believe that an adequate wage will eliminate much of the ill health associated with many industries. In regard to this industry, however, such is not the case. The employees most exposed to the dust are, as a rule, skilled workers who command a good wage. Of the twenty-one men included in this report, seventeen were skilled workers capable of making from twenty-five to forty dollars per week prior to the onset of ill health.

The secretary of the Potters' Union at Trenton informed me that, so far as could be judged from reports from other unions throughout the country, there existed at the present time, among the sixteen thousand potters, from one hundred and fifteen to one hundred and twenty cases of tuberculosis.

Pathology. The pathological changes induced by dust of various kinds depends to some extent on the intensity of the irritation set up. Exposure to almost any kind of dust even for a short time is apt to irritate the respiratory tract and produce coughing. This may become a true bronchitis if the exposure is sufficiently long. Between simple irritation as the result of a brief exposure, and extensive tissue changes, as the result of prolonged exposure, varying degrees of pathological alteration may occur.

Clay and flint both contain very hard, sharp, angular particles of siliceous matter, which when drawn into the respiratory tract during inhalation are not dissolved by the bronchial secretions, but are deposited in the alveoli and smaller bronchi. For a varying length of time the inhaled dust is arrested in its advance partly by the mucous secretion in the bronchial tubes and partly by the ciliated epithelium lining the tubes. Sooner or later, however, these defensive forces weaken, and finally the dust passes into the lymph channels, and also along the finer bronchi, until it reaches

the parenchyma of the lungs. As a foreign substance it then sets up a chronic inflammatory process.

The histological changes which occur in the lungs from prolonged exposure to coal dust have been studied by Wainwright and Nichols (*American Journal of Medical Sciences*, 1905, Vol. CXXX). Inasmuch as the prolonged inhalation of any form of inorganic dust tends towards the same end, namely, the production of pulmonary fibrosis, the changes described by these authors, as occurring in anthracosis, are applicable to other forms of dust.

Wainwright and Nichols describe the changes which the deposit of coal dust produces as follows:

1. In the case of those who have worked in the coal mines but a few months some of the epithelial cells lining the alveolae become swollen and contain particles of coal dust. Sometimes a few larger desquamated cells containing much pigment are found in the alveolae lying loose with some detritus and free dust particles. Even in this early stage, dust particles are seen in the walls of the air vesicles and around the small bronchi. In this first stage there is no evidence of connective tissue proliferation.

2. In those who have worked in the mines for several years the swollen epithelial cells containing dust particles are much more numerous. The alveolae also contain more detritus consisting of swollen, dust-bearing epithelial cells, free dust and some leukocytes. At this time evidences of connective tissue proliferation become apparent. The pigment in the walls of the air vesicles becomes more marked and collects particularly in the connective tissue septa between the lobules where it is in such large masses as to be easily seen by the naked eye in the microscopic sections. These masses are especially well seen in the septa that run in from the pleura. In places considerable-sized black triangles are seen with their bases on the pleura, showing where some septum has been completely filled up with dust. With this deposit there occurs an increase in the connective tissue of the alveolar septa. The interlobular septa thicken as does also the peribronchial connective tissue, as here also the dust tends to collect. (The gradual evolution of the process is apparent from a study of a potter's lung made by Wilson Fox (*Diseases of the Lungs and Pleura*, 1891, p. 494). In the specimen described by him there were numerous round granulations varying in size from a pea to a millet seed, almost entirely composed of deeply pigmented fibrous tissue. Some of the older granulations were entirely converted into fibrous tissue having a concentric arrangement, but solid in the center, the pigment being also more or less concentrically arranged. In others, apparently more recent, there was a central part strongly resembling a bronchiole surrounded by a concentrically arranged fibrous tissue, between which and possibly contained in fusiform cells there was abundant black pigment in a finely gran-

ular form. The tendency of the dust to collect in masses at individual points is especially noticeable in the lungs of porcelain makers. According to Oliver (*Dangerous Trades*) small chalk-like masses are often found in the lungs, and to the uninitiated may be confounded with cretaceous tubercles.)

In this second stage the bronchial and mediastinal lymph nodes become enlarged. As a result of exposure to nearly any dust the bronchial lymph nodes are black and in the case of coal miners, intensely so. The nodes in the lesser omentum are also frequently pigmented from dust swollen in the saliva.

The connective tissue changes in this stage are almost never sufficient to give signs of consolidation.

3. It has long been recognized that the progress of the respiratory disorders incident to the inhalation of irritant dust may be arrested if the individual will seek some other employment. The reason for this is apparent from the observations of Wainwright and Nichols. They found that in the case of individuals who had formerly been miners, but who for many years had not followed that occupation, the lungs no longer showed signs of irritation. The swollen epithelium had subsided and again become normal, and neither the cells nor the alveoli contained dust. The deposits of dust in the alveolar walls, the septa and the peribronchial tissue, however, still remained as did also the connective tissue thickening.

The gross changes are briefly as follows: The first change noted is in the upper respiratory tract and occurs in the form of a pharyngitis which commonly persists, ten of the twenty-one cases reported in this paper had congestion of the pharyngeal mucosa. At this stage there may be some cough of a dry, hacking character. This is often the result of a tracheitis. Gradually the process extends downwards producing a bronchitis which sooner or later becomes chronic in nature. At this stage the lung begins to show the evidence of fibroid changes. Furthermore, as the result of the chronic bronchitis, varying degrees of emphysema develop, and we have the condition commonly known as miner's or potter's asthma.

As the fibrosis increases there is added to the picture dilatation of the bronchi. The dilatation of the bronchi is rarely sacular, but as a rule cylindrical and the bronchi are pretty generally involved. The dilatation of the bronchi results partly as the result of the loss of elasticity in the bronchial wall and partly as the result of the chronic inflammatory condition of the bronchial mucosa which tends to weaken the wall. The bronchi having lost their elasticity and, in addition, being weakened, are, therefore, apt to dilate to a greater or lesser extent from the strain put upon them by the cough.

The fibroid changes which occur as the result of dust are bilateral and fairly evenly distributed throughout both lungs. Partly because of this,

and partly because of the associated emphysema, the marked chest deformity which characterizes unilateral massive fibrosis does not occur.

According to Oliver the dust is apt to first attack the posterior and inferior portions of the lungs rather than the apices.

The relationship which exists between the inhalation of dust and tuberculosis is an interesting one, and the belief that dust has a strong predisposing effect in producing pulmonary tuberculosis is pretty generally accepted. Mortality returns for years have shown that the death-rate among potters is excessive from respiratory disorders, particularly tuberculosis. Hoffman (Bulletin of the Bureau of Labor, No. 79, Nov. 1908) states that the experience of the Prudential Insurance Company for the years 1897 to 1906 shows that out of three hundred and eighty-four deaths among potters one hundred and twenty-seven or 33.1 per cent. were from tuberculosis, and that the rate was excessive from all ages. In addition there were fifty-seven deaths from respiratory disorders, other than consumption.

The Tenth Annual Report of the United States Census records one hundred and thirty-six deaths among potters of which forty-seven were due to pulmonary tuberculosis, a percentage of 28.9. In Trenton, New Jersey, for the year 1911 there were fifty-eight deaths among potters, from all causes, and of this number twenty or 34.4 per cent. were due to pulmonary tuberculosis.

At first sight these figures seem to point conclusively to the fact that the death-rate from tuberculosis is excessive among potters. When we recall, however, the changes which are produced in the lung by reason of the inhalation of inorganic dust, it is evident that the process is in the beginning of a non-tuberculous fibrosis of the lungs. Furthermore, it is well-known that the symptoms and physical signs produced by such changes are essentially the same as in tuberculosis. It seems quite likely, therefore, that in not a few instances it has been assumed that the process was tuberculous, and death was ascribed to this cause, without an examination of the sputum having been made to determine the true nature of the disorder. Tatham (Oliver's *Dangerous Trades*) in commenting on this aspect of the question states that: "Potters succumb to non-tubercular disease of the lungs much more rapidly than they do to tubercular phthisis, and it is certain that much of the so-called potter's phthisis ought properly to be termed cirrhosis of the lung. Deaths from this affection should never be included under the head of phthisis, which term is now restricted by universal consent to the tubercular malady of that name." One of the patients whom I had under observation was of this type. He had extensive pulmonary damage and all the symptoms of tuberculosis, and yet a number of sputum examinations were negative.

On the other hand it is to be borne in mind that the cause of death in

cases of this type is not infrequently given as being due to chronic bronchitis, emphysema, pleurisy, etc. This might possibly equalize the error.

There is still another factor to be considered, namely, the effect of an antecedent fibrosis of the lungs. It is well known that the stimulation of connective tissue growth is the way in which nature overcomes tuberculosis. Therefore anything which stimulates such a growth in the lungs should aid in preventing the tubercle bacilli from getting a foot-hold, or in overcoming or retarding their growth, if they become established in the pulmonary tissue. This is the view held by Wainwright and Nichols, who found that true tuberculosis was not a frequent finding among coal miners, but that extensive fibroid changes in the lungs, as the result of coal dust, was exceedingly common. The protecting influence, in their opinion, was the fibroid tissue and not the coal dust itself, the latter having been held by some to have germicidal qualities.

While potters are not freed from the danger of becoming tuberculous by reason of the fibrosis which is produced incidental to the inhalation of clay and flint dust, it seems reasonably certain that the fibrosis does tend to retard the progress of the tuberculous infection. Thus it has long been recognized that the age period at which potters succumb to the disease is far beyond the average, and in addition, so far as my observation goes, the disease seems to be much less severe than the same amount of damage produced in other classes of patients.

Most of the available statistics on the subject support this view. Thus the English mortality statistics for the three years ending 1902 (Supplement to the Sixty-fifth Annual Report of the Registrar-General) states that the mortality of potters, between the ages of twenty to thirty-five years, falls below that of occupied and retired males generally. At every other age period, however, it shows an excess which amounts to no less than 74 per cent. at ages forty-five to fifty-five years, and to 66 per cent. at ages fifty-five to sixty-five years. The principal excess falls under the head of respiratory diseases. The following tables serve to indicate this point:

I. Proportionate mortality from consumption among potters, 1897 to 1906, compared with that of all males in the registration area of the United States, 1900 to 1906, by age groups. (Experience of Prudential Insurance Company, Hoffman, Bulletin of the Bureau of Labor, No. 79, Nov. 1908.)

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Age at death.	Death of potters, 1897 to 1906, due to		Per cent. of deaths due to tubercu- losis among males in registration Potters area, 1900-1906.	
	All causes.	Tubercu.		
15 to 24 yrs.	46	11	23.9	27.8
25 to 34 "	68	36	52.9	31.3
35 to 44 "	84	37	44.0	23.6
45 to 54 "	78	22	28.2	15.0
55 to 64 "	72	14	19.4	8.1
65 yrs. or over.	36	7	19.4	2.7
Total.	384	127	33.1	

II. From the Annual Report of the New Jersey State Board of Health for the year 1911:

Age.	Number of deaths from tuberculosis.
15 to 20 yrs.	1
20 to 30 "	5
30 to 40 "	4
40 to 50 "	4
50 to 60 "	4
60 to 70 "	2
Total.	20

III. Ages of patients included in present report:

15 to 19 yrs.	1
20 to 24 "	1
25 to 29 "	5
30 to 34 "	1
35 to 39 "	4
40 to 44 "	5
45 to 49 "	1
50 to 54 "	3
Total.	21

If we consider the length of time the men have been employed in the trade, it is evident that the tuberculous infection is engrafted on the fibroid process very late, or, in view of what has already been pointed out, that the tuberculous process, if an early manifestation, has been kept in abeyance. The tuberculosis finally gains the upper hand, because the general resistance has been reduced by the primary trouble plus certain habits of the individual to which we have previously alluded, namely, poor sanitation and dissipation.

The following table indicates the length of time the twenty-one cases I have had under observation worked in the trade:

Under 10 years.	10-19.	20-29.	30-39.	over 40 years.
2	8	6	3	2

From this it is seen that only two worked at the trade for less than ten years. The length of time the men worked in the pottery ranged from two to forty-two years, and the average for the twenty-one was twenty-one and seven-tenths years.

Symptoms and physical signs. Pulmonary disease as the result of inhaling irritating dust may manifest itself in three forms: (1) as ordinary tuberculosis, either acute or chronic; (2) as a general fibrosis of the lungs; and (3) a mixed form in which a tuberculous process is engrafted sooner or later upon the fibroid condition.

When tuberculosis occurs in a potter who has but recently entered the trade, or who, at least, has not followed the trade for a time sufficiently long to produce fibrosis of the lungs, the symptoms and course of the disease differ in no particular from those encountered under ordinary circumstances.

Fibrosis of the lungs is sometimes referred to either as fibroid phthisis, or, when the cause of the fibrosis is due to dust, as pneumoconiosis; the latter term, which is general, may be modified still further by indicating the character of the dust as chalicosis when due to flint dust, anthracosis when due to coal dust, etc. Among the working men themselves such names as miner's asthma, grinder's rot, potter's rot or potter's asthma, are prevalent.

Fibrosis of the lungs is always slow in developing. As has already been indicated in the pathology of the process, it is a chronic inflammatory reaction taking place around many minute foci of dust, and which, as time goes on, tend to coalesce and involve larger and larger areas of pulmonary tissue.

In the beginning little or no inconvenience is experienced from the inhalations of dust. The first thing to be noticed is a slight irritation in, and a desire to clear the throat. Next a slight cough develops which may occur in the morning only. Later some blackish viscid mucus appears after the cough. As the process advances the cough and expectoration become more and more marked. Examination of the lungs at this stage will show the evidences of chronic bronchitis, and some emphysema. Physical signs indicative of consolidation are rarely met with at this time, although they may occur.

At some period, rarely less than ten years, and not infrequently more than twenty of continuous employment, the worker begins to experience some tightness in the chest, the breathing gets shorter and shorter and

finally the disturbed lung function becomes so pronounced as to render the victim less and less capable of exertion. In spite of this condition, however, the general health may be but little impaired, and unless the dyspnea be too great, the patient may not be compelled to cease work.

By this time the fibroid changes in the lungs have become extensive, although the physical signs may indicate nothing more than a diffuse chronic bronchitis. There is quite likely to be added to the picture, however, evidences of bronchiectasis. Cavity signs may be present, commonly in the region of the angle of the scapula, and when they are, a diagnosis of tuberculosis is usually made. Marked clubbing of the fingers and the expectoration of large quantities of sputum, sometimes of a foul odor, are also strongly suggestive of bronchiectasis.

The distinguishing feature of general fibrosis of the lungs is the contrast between the extensive pulmonary lesions and the absence of marked constitutional symptoms. "Herein fibroid phthisis presents a well marked difference from pulmonary tuberculosis; and even if, as we have said, the disease becomes complicated with tubercle, yet the rate of progress may be determined rather by the character of the primary than of the secondary disease, though usually the supervention of tubercle hastens the sufferer into a more rapid consumption." (Report of British Departmental Committee on Compensation for Industrial Diseases, 1906, p. 13.)

With one exception, the cases I have observed belonged to the class in which tuberculosis was apparently engrafted upon a fibroid process. The initial symptoms in these patients were apparently trivial, and the duration of their disease, as given by the patients themselves, was as follows:

Under 1 year.....	9
1 to 2 years.....	9
4 to 5 years.....	3
	—
Total.....	21

Contrasted with the length of time they were ill, it is interesting to note the stage of the disease as judged from the signs indicative of pulmonary damage:

Incipient.....	1
Moderately advanced.....	3
Advanced.....	16
Non-tuberculous.....	1
	—
Total.....	21

During the time they were under observation (from two weeks to six months and longer) fever was absent in four; in fourteen the temperature did not exceed 100° F.; and in three temperature range was above 100°F.

Tubercle bacilli were found in fifteen; in five the sputum was negative, but only one of these had repeated examinations. The remaining four had but a single specimen examined, and for this reason one cannot be certain that they were not actually tuberculous. One case had no sputum.

Dyspnea was pronounced in fourteen of the twenty-one.

Loss of weight had occurred in all but one.

Marked clubbing of the fingers and curving of the nails were noted in ten of the twenty-one.

Finally, it is to be noted that with two or three exceptions, these patients did not impress one as being very ill, even those who had slight persistent fever every afternoon.

Prevention. As has already been stated, the improvements which have been made in the process of pottery manufacture have led to a reduction in both the morbidity and mortality rates of those following this occupation. This is especially true in regard to lead poisoning, which had practically disappeared among American potters.

The dust problem, however, has not as yet been completely solved. The dust which is most feared by the potters themselves is the flint dust used in packing the clay ware for firing, and entering, to a slight extent, into the composition of the raw material. The danger from this source could be greatly minimized if the "saggers" were packed and unpacked under exhaust hoods, which would remove the dust that is stirred up in this process. In addition there should be devised some better method of delivering the flint dust from the storehouse. As it is the dust is carried by the workmen in uncovered boxes and small amounts are apt to be spilled in transit.

"Towing," or the removal of the rough surfaces from the dried clay ware, could also be rendered safer if the work were performed under an exhaust hood. Oliver states that the dust difficulty in this process "can to a large extent be got over by finishing the ware in the 'green' condition." In some of the French potteries the slightly moist ware is smoothed with paper before being heated.

The most difficult problem is to prevent the accumulation of the dust which comes from the small fragments of wet clay thrown off in the process of fashioning the various articles. At the present time the major portion is removed by sweeping out the rooms after work hours. Oliver contends that much can be done by means of improved ventilation, and that in addition to open windows, fans and strong aspirating draughts must be provided.

It is not to be forgotten that the workman himself has a very important part to play in the prevention of disease incident to this occupation. Not a little of the danger from the dust could be eliminated if the workmen made frequent changes of their working clothes. As a rule the men wear

their working garb for an indefinite period, and as a result the meshes of their aprons and shirts become filled with the clay. The movements incident to their work are constantly releasing some of this fine, impervious dust and in this way much is inhaled which ordinary cleanliness would prevent. A covering for the head could also be used to advantage.

My own observations have led me to believe that more care could be exercised on the part of the workman in the disposal of the fragments of clay which are thrown off in the fashioning of the various utensils. Too much of it is allowed to fall on the floor about the work bench, and as a result is walked upon and quickly pulverized into dust.

Face masks have been repeatedly advocated, but have never been particularly successful for the reason that the workmen are averse to using them.

Because of the fact that the respiratory disorders of potters are extremely slow in their evolution, and because it is known that removal from the occupation will check the progress of the trouble, the individuals will follow this trade, especially those working in the dusty departments, should be subject to frequent medical inspections. A compulsory medical examination three or four times a year would undoubtedly result in detecting many cases which otherwise would pass into the terminal stages of potter's asthma or tuberculosis.

Finally, the life of the workman outside of his hours of employment plays a part which cannot be ignored in estimating the various factors which bring about ill health.

In this occupation as in many others, it is well to remember that in the badly ventilated state of one factory compared with another, the home life and surroundings of the work people, poverty, heredity, age and sex are to be found conditions that favor the production of ill health, and are therefore, not to be ignored. Usually it is a gradual deterioration of health that is produced. There is nothing of the nature of an acute illness in industrial disease comparable with an accident, except possibly anthrax.*

* Oliver's Dangerous Trades.

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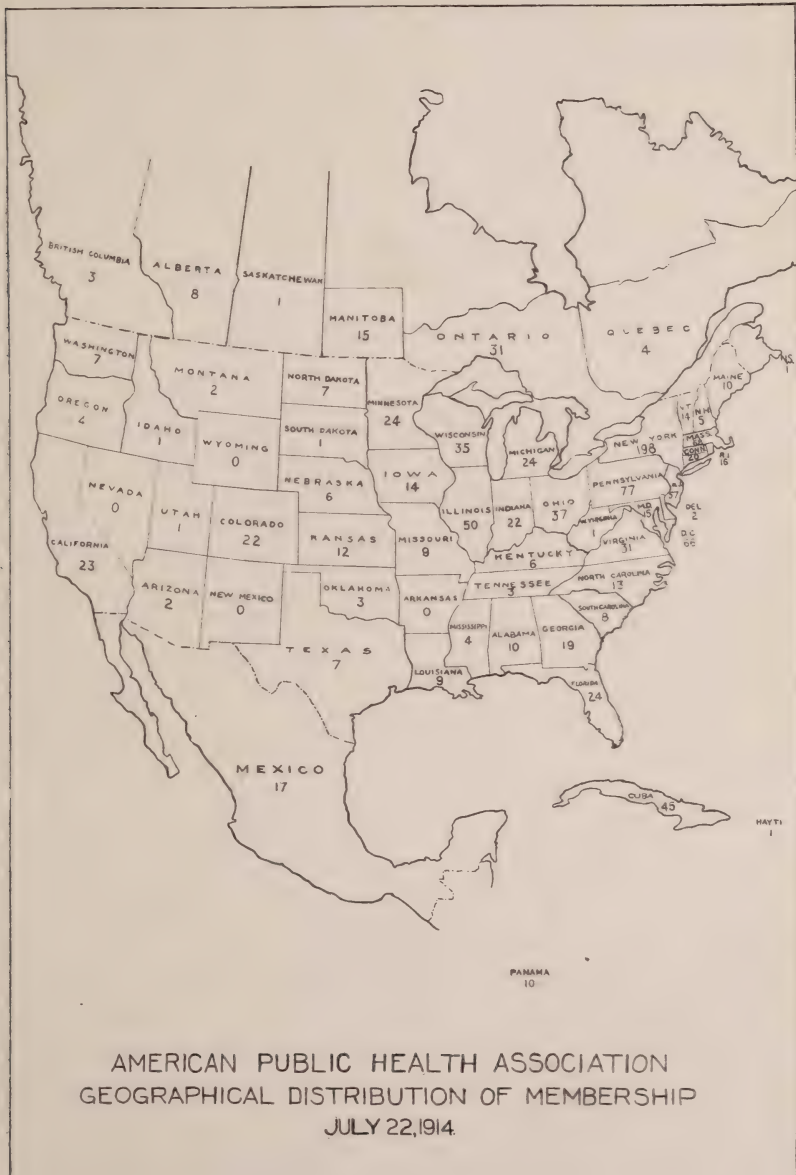
WANTED FIVE THOUSAND MEMBERS.

The American Public Health Association needs five thousand members, and here are some of the reasons why.

It is doubtful if there is a field of public usefulness more promising of good results for humanity than that which lies before the Association. The popular mind is just at the point where the teachings of sanitarians will fall on fruitful ground. The people are ready for an education in elementary health principles and with such an education will constitute the vital force in the country for better health and better conditions. Such work is for

the benefit of the individual and the community and through these for the highest interests of state and nation.

Such work is within the scope of the Association and is, indeed, the real reason for its existence. Although it has already done much good, still better things lie ahead. To realize its full mission the Association must



grow and it can grow only when the members realize what its great possibilities are and pull together enthusiastically for their fulfillment.

Look on the map and you will see that the membership today in the Association is approximately only one for every hundred thousand of population. Every one must realize that this is absurdly small for an association of such interests and the fact is more striking when it is seen that the distribution is not even, some sections having less than their proper proportion. The low places on the map are unfortunately some of those where there is need of a force such as the Association represents.

The achievements of the Association include the dissemination of trustworthy information at its meetings and in its JOURNAL and its gatherings in different places with all that they mean in interchange of experience and spread of knowledge. These are true achievements, but other things are needed. There should be expert and practical advisers to health workers and a clearing house of sanitary and health administration information. Such functions are clearly within the scope of the Association, but the association that can afford to undertake such things must have the financial security of a larger membership.

The country needs just such a center for the coördination of effort. There are thousands of workers willing but lacking the proper directive authority, and without this are oftentimes paying attention to showy but minor methods to the neglect of the major opportunities.

Especially must we attend now to the great work of elimination of politics in the selection of health administrators and officials. Closely related to this is the big problem to find the right man for the place. While not posing as an employment bureau the Association could keep track of such men and place them just as the educational institution keeps track of and places its alumni.

Then there is the question of the JOURNAL. Good reading is the best education the world affords. There is plenty of good literature on health problems waiting to be published. Such education of the community requires a large association to support it.

Look at the map again and see what you can do towards these ends among the people in your locality who are interested in health.

HYGIENE OF STREET CARS.

Not long ago a health officer inquired of a physician regarding his interest in the local board of health. The reply was in effect that he had little interest, because it always seemed to him that such bodies are active in minor preventive measures and neglect those that are most obvious and important. "There are the street cars, for example," he said, and here he is right.

The street cars under existing American conditions can hardly be otherwise than clearing houses of infection. They are likely to remain such until the people are educated to a realization of their danger. Everything, almost, that is communicable must find its way to the street railway conveyances, and in the rush hours one must willynilly be jostled and hustled by all qualities of men, who in addition cough and sneeze and breathe into the modicum of confined air. Here the settling process that large rooms and even theatres and public halls permit for oral spray and droplets is not possible and one must take his chances and hope he has immunity, if he is to travel at such times.

Very few have any idea of what the conditions are in street transportation. Those for Boston have been recently collected and they have the merit of presenting conditions that exist today. At the three important street railway termini where trains are in use, counts were made between 4.30 and 6.30 in the afternoon. At Dudley Street, there were 32,500 passengers in trains with seats for 17,800; at Sullivan Square there were 24,000 with seating capacity for 16,000 and at the Park Street end of the tube to Cambridge the figures were 14,000 with seats for only 10,000. This means that nearly half the passengers are standing, their faces fixed in positions relatively immovable and with little spare space, while the other half are at a lower level, almost as immovable and in almost as good a place to catch the mouth spray of their fellows.

Now this is the condition that for two hours in the morning and two hours at night is the prevailing one in many large cities. The single trams are even more closely packed, sometimes one hundred with seating capacity of thirty. Twice each day in Boston one hundred thousand persons are jammed together in this way, and leaving aside decency, there is an obvious violation of a fundamental proposition in hygiene.

If a half-a-dozen women are huddled in a room to make slop-shop clothing, the law limits interferes or prohibits; if half-a-score of granite workers in a ramshackle shed practically out-of-doors engage in their work, they must be protected for it is a dangerous occupation; if a poor little huckster seeks to house a horse or two in a stable, he must petition, construct and conform to regulations,—all these in the interests of the public health. But when hundreds of thousands confront danger that has come into contempt through familiarity, practically nothing is done.

THE SEWAGE DISPOSAL PROBLEM IN VILLAGES AND SMALL CITIES.

GEORGE C. WHIPPLE,

Consulting Engineer, New York City, Professor of Sanitary Engineering in Harvard University and the Massachusetts Institute of Technology.

Read before the Massachusetts Association of Boards of Health, Boston, July 30, 1914.

Those of you who knew Dr. Thomas M. Drown, chemist to the Massachusetts State Board of Health in the days of its early activity, will remember the phrase that he often used, "the state of change is the state of danger." This referred particularly to the nitrogenous organic matter in drinking water, but even he must have recognized that it had a much wider application. The idea crops up in many proverbs, "Let well enough alone," "Don't change horses while crossing a stream," and the like. The state of change is the state of danger, trouble and excitement.

The transition from boyhood to manhood is one of these troublesome periods. During these months the boy's arms grow long and his coat sleeves grow short; he becomes too tall for short pants before he is tall enough for long pants; he tries to smoke, perhaps, but doesn't dare to try again; he looks far ahead and forgets the present. Meantime his father has discovered that trousers cost more than short pants, and his mother makes it plain that the boy's way of getting dirty and washing up must be abandoned and the way of keeping clean substituted for it.

In much the same way a village grows up into a young city and the state of change from village-hood into city-hood is a state of danger. Some towns are in a hurry to grow up into cities. They put on their long trousers too soon. Others delay until their awkwardness becomes conspicuous. Some towns rush into city ways, demand the city's mechanism of government, spend money for physical improvements,—only to find that their comfort has not increased while their taxes have increased. City life is different from country life; but it is not necessarily better, and it is more expensive.

The movement for city planning is well under way in this country. It is a good movement and one that should help the small city quite as much as the large city. It is an effort to prevent the state of change from being a state of danger, an effort to guard the future against present mistakes, and not merely, as some one has said, an attempt to make half of the streets run diagonally in order that there may be a triangular square at each intersection, as in Washington. The one danger in this movement is that imagination be not tempered with good engineering and business

judgment, that the element of thrift be omitted. A good rule for young cities to follow is, "Make your plans now; don't build until you need to; when you do build, build on the plan."

I have been asked to speak to you on the sewerage problem in the village and small city and what I have just said applies to this problem quite as much as to the laying out of streets and the choice of open spaces for parks. A great deal has been done in this country to improve the methods of sewage disposal in our large cities. We also hear a great deal about the problem of rural sanitation—a natural result of that most salutary campaign for pure milk. But the problem of village sanitation lies betwixt and between. It is a difficult problem from an executive standpoint—one of the most difficult that we have to meet. You health officers know what I mean, the problem of the village slum.

In our sanitary discussions we talk glibly about rural and urban conditions. Just what do we mean? What we, doubtless, have in mind is that in rural communities families live individualistic lives as far as their physical surroundings are concerned, with independent water supplies, with their own milk supply, with their own separate methods of waste disposal. In villages this is not entirely the case. The milkman appears on the scene, but every one knows him and how many cows he keeps and where. Houses are so close together that a single cesspool is sometimes used in common by several families or running water is piped from a common source to a small group of people. But every one knows about the cesspool and the big well and has a personal interest in their care. Such a condition may also be fairly included under the term rural, although perhaps it is not "truly rural." But there comes a time when the village has a thousand or two inhabitants, when the milkman is a stranger, when the water comes through pipes from a source practically unknown, when one half does not know how the other half lives; when, to use a biological expression, the individual cells become highly differentiated, when the community becomes in fact an organism, and as such requires a thinking part, an eating part, a working part, and waste-disposal parts. The analogy is certainly not inapt and might be extended *ad minutia*. Rural life is unicellular life; multicellular life is urban life. Multicellular life is the more highly organized; it requires more directive force, more division of labor, more coördination. A city is not only a body politic, it is a body organic. If one member offends, the whole body suffers.

Our statisticians make the line of cleavage between rural and urban communities one of size, not one of function, and size is controlled by political boundaries. This is necessarily the case, but in drawing conclusions from statistical data we should remember the fact that size and function are not always correlated. Are people healthier in the city or on the farm? Ordinary statistics do not tell, because they do not separate the rural

village from the farm areas. The expression "rural typhoid" has caused us to malign the old oaken bucket and commit other crimes, but the fact is that the statistics of rural typhoid would not be high if they were confined to the "truly rural." Typhoid fever is likely to be high, however, in small communities that have not learned how to keep clean. Small communities frequently do not realize that they are becoming a body organic, a multicellular organism, until some of the individual cells begin to die.

The problem of the disposal of fecal matter is the same the world over and has always been the same. We have three places of disposal, and only three. We may put it on the ground, beneath the surface of the ground, or into water. Perhaps, by including the processes of evaporation and combustion and the work of flies, we might add a fourth place, and say also into the air. We still practice all three methods.

The primitive method was to put it on the ground. We still do so. It is done by wanderers in the woods and by travelers on our railroad trains, including those who travel in Pullman cars; it is done in the dark alleys of our streets and in our parks; it is common practice among the ignorant colored people of the hookworm regions of the South and its disastrous effect has been eloquently depicted by Stiles. On our farms and in our villages we still put fecal matter upon the surface of the ground, only we store it first beneath the privy seat or in a pit and at our convenience spread it upon the fields and gardens.

Very early in his history man learned that burial was a safer method of disposal. Professor Winslow recently called my attention to the fact that Moses commanded the children of Israel, traveling in the wilderness, thus: "Thou shalt have a paddle among thy weapons; and it shall be, when thou sittest down abroad, thou shalt dig therewith, and shall turn back and cover that which cometh from thee." (Deuteronomy 23:13.) And we today recognize the greater safety of burial. It is better to spread the contents of the privy beneath the soil and within the top soil than upon the surface, better as a sanitary measure and better as an agricultural measure. It is better in general, though not always, to use a cesspool than an open privy. I say not always because we know that concealment is not always cleanliness. The housemaid may sweep the chamber floor clean and push the dirt under the bed; the room looks clean, but sometimes the dirt is found. We put fecal matter into cesspools, and thus conceal it in a convenient way, often, with wisdom and safety, but sometimes the living dirt gets into a neighbor's well.

Putting fecal matter immediately into water and transporting it by water is comparatively a modern invention. Sewers were not used for this purpose until early in the nineteenth century. Before that they were drains and it was against the law to put fecal matter into a sewer. The perfec-

tion of the water closet and its wide use in houses provided with running water is distinctly modern, and its convenience and luxury no one can deny. But its use has created a double problem, for the water as well as the fecal matter must be disposed of. We bring the two substances together in our houses; shall we separate them for purpose of ultimate disposal? That is one of the great sanitary problems of the present day, the treatment of sewage.

In practice we have developed three common methods of fæces disposal: privies, cesspools, sewers. The first two are naturally adapted to individual premises; the last is a communal or coöperative measure. Hence, the first question likely to arise in a growing village is, shall we have a sewerage system? This question seldom arises until after a public water supply has been installed, but it follows soon after. With running water in their houses people naturally install water closets and this places a heavier burden upon cesspools and in some cases may surcharge them. In regions where the soil is tight, consisting of clay or hardpan, or where the underlying rock is near the surface, this is sure to occur and the installation of running water must inevitably be followed by the construction of sewers, and, if sewers are built the sewage must be taken care of. Hence, the time to count the cost is before the water supply is introduced. In localities where the soil is porous the installation of a water supply does not necessarily mean the immediate construction of sewers. Cesspools may work satisfactorily because the open soil can dispose of the waste water. It should mean, however, the abandonment of local wells. And even in a sandy locality there comes a time when the cesspools kept in the same spots cease to take care of the sewage properly and when sewers must be constructed. A change of location, however, will often prolong the life of a cesspool.

When, a few years ago, we were less careful of our sanitation than we are now the problem was regarded as being solved when the sewers were built. Where the sewage went to was a part of the problem to which we gave too little heed. "Out of sight, out of mind," was the motto. We can do that no longer. Our laws prevent it and our growing spirit of brotherhood prevents it. In the early days we had no wilful intent to injure the health of a neighboring city. We simply did not know. Now we do know. And we realize that in most cases we must submit the sewage to some form of treatment before allowing it to flow away and join the waters of the world. To a greater or less degree we must separate at the sewer outfall what we have put together in our houses—clean water and foul wastes. The necessity for the treatment and the completeness of the process vary enormously in different places, depending upon the relative volumes of the sewage and the water into which it is discharged, the character of both, the use that is made of the water after the sewage is put in, the season of the year, the

opportunities for the material destruction of the waste products and other factors. Sometimes no treatment at all is necessary; sometimes the process must be elaborate and expensive.

I believe that it is possible to greatly improve the so-called dry methods for disposing of fecal matter, such as the earth-closet system, the chemical disinfectant closets, the incinerator processes, and steam disinfection. Those who have followed the history of camp sanitation know that marked improvements have taken place in recent years. Our better knowledge of the dangers of the dry methods should enable us to avoid them. There are, doubtless, many places where the methods of the camp may be adapted to the village dwelling-house with safety and satisfaction, thus avoiding the problems that arise when fecal matter and water are put together and conserving the fertilizing constituents of the waste products. There are so many small communities in the country that the problem is worthy of serious consideration by competent minds.

In spite of improvements in this direction there is no reason to think that the water carriage system will not be continued for many years. At present the tendency is constantly towards a more lavish use of water. Hence, as villages increase in population and in population density sewers become inevitable. The cesspool system represents what may be called the short-pants stage of sanitation. Cities using this system have not grown up. Sewers represent the long-trouser stage.

The first step is to provide a sewer plan—not a plan for the present, but an adequate plan that will anticipate future developments as far as this is humanly possible, a plan that will consider not only the sewers themselves but the disposal of the sewage and the mode of treatment required, if any. Sewer planning is an important element of city planning. It should not be left until the necessity arises, until some outbreak of disease compels hasty and ill-considered action, until enforced by legal pressure at the hands of some one who has suffered from its neglect. This first step is often difficult to take. It means a survey and a scientific study by an experienced sanitary engineer. Small cities hesitate to secure adequate advice. Their citizens hesitate to acknowledge their inability to prescribe for themselves. They do not like to call in the physician before they are sick.

The second step should be that of counting the cost. It sometimes happens that a community cannot afford a sewerage system and a disposal plant. If a city cannot afford to operate a disposal plant properly it would be better not to construct it. It sometimes happens that a local nuisance of small magnitude can be corrected without entering upon a general system of sewerage and at far less expense. It sometimes happens that money is needed more for some other improvement than for sewers. Hence, it is necessary to consider these other improvements as well as sewers. In short, town planning, or city planning, is necessary, and sewer planning is an essential part of it.

Having a sewerage plan and the necessary financial resources, the third step is construction, and the fourth is operation. The last step is often the most difficult of all, and nothing, at the present time, is more disheartening to the sanitary engineer than to witness the shameful neglect of so many sewage treatment works that have been constructed after careful study and at great expense. A neglected cesspool is a local and individual disgrace and usually harms most him who neglects it; but a neglected sewage treatment plant is a public disgrace, a sad blot on the civic pride, while the harm done may extend far beyond the bounds of the community.

In general it is more difficult to secure efficient operation of small sewage treatment plants than of large plants. The large city can afford the services of trained specialists to supervise the work of the laborers who operate the plant. The small city can afford only the laborer, not the specialist. Several small cities can sometimes combine for the purpose of obtaining the needed scientific control. The least efficiently operated works of all are those of the small institution or private estate. They are often utterly neglected, and largely for the reason that when an expensive installation is substituted for the cheap cesspool, the owner expects that he ought to give it less care, not more. Not long ago I had occasion to inspect a number of summer camps on the shores of an Adirondack Lake. They were large houses and some had several bath-rooms. A score or more had cesspools and in almost every instance these were giving no trouble; they were doing their work in the old-fashioned way and moderately well. At half a dozen places expensive disposal works had been constructed; concrete tanks and beds of broken stone and underdrains and all that. Without a single exception these plants were working badly and the lake was being polluted, not alone by the liquid effluent, but by grosser solids. And in every case, also, the owner informed me that he had understood that the plant was to be automatic. Now, no sewage treatment plant will run without attention whether it be cesspool, septic tank, sub-surface irrigation field, intermittent sand filter or sprinkling filter.

Experience has shown, and perhaps it may be set forth as a general law, that the smaller the plant the less constant can be the personal attention given to it; hence, the smaller plants should be so designed as to require less constant attention. When a village abandons cesspools it must be prepared to adopt a system that requires a more constant supervision than cesspools require, unless it is so situated that the sewage, with little or no treatment, may be safely discharged into some stream or lake or harbor of adequate capacity to receive it or into some metropolitan system of sewers such as we have in and around Boston. And in choosing between one or another system of treatment the element of constant supervision is an important one to consider. Another is the danger of local nuisance. And always, of course, is the element of cost.

The villages and small cities of Massachusetts are fortunate beyond those of most states in having soils which are well adapted to that method of sewage treatment known as intermittent sand filtration, a method which, in small installations, offers the best combination of efficiency, economy, freedom from nuisance and simplicity in operation. The Massachusetts State Board of Health has done well in fostering this method. It is possible, of course, for cities to outgrow this plan, and in such places as Worcester and Brockton we see evidences of its being outgrown through lack of area to expand. Brockton now has a trickling filter which is used in connection with the sand beds and a trickling filter is being built at Fitchburg. The larger places can afford to use the methods which require more constant attention. The same methods may be used by small communities provided that they are able and willing to pay the price.

In considering the cost of a sewerage system and the proper operation of disposal works, it must not be forgotten that cesspools have to be cleaned periodically and that this costs money. In many villages and small cities the cost of cesspool cleaning would pay for the efficient operation of sewage treatment works, and this substitution of a public expense for a private expense would be accompanied by benefits which may be measured in terms of health, decency and comfort.

It is hardly necessary perhaps in this age, and certainly not before this association, to say that the ordinary open privy in the village and small city is an anachronism, an unmitigated nuisance, uncomfortable, unsightly, and a menace to the public health.

It may be of interest to look at a list of the cities and large towns of Massachusetts to see which of them are still without sewerage systems. (See Appendix.) On discovering that many of our villages and towns still have this lack, it must be remembered that in its sewerage policy Massachusetts educates; it does not compel. Most of our large towns and cities have profited by this education and adopted modern methods, but a few are still in the state of the over-grown boy dressed in short pants. Most of our Massachusetts cities also take reasonably good care of their sewage treatment works. It is fair to say, therefore, that the policy of the State Board of Health in this matter has been a good one for Massachusetts, possibly better than that of coercion. Is it not reasonable to suppose that this may be due in part to the fact that a plant built as a result of education will be better built and better operated than a plant built and operated by coercion?

In these closing days of the State Board of Health may we not rise to do honor to its memory and to the faithful men who have devoted the best of their lives to its work. All sanitarians in America and abroad are proud of the work of the Massachusetts State Board of Health and of its pioneer work in sewage disposal experiments. Let us hope that the new Department of Health soon to arrive will do equal honor to the state.

APPENDIX.

PUBLIC WATER SUPPLIES AND SEWERAGE SYSTEMS IN MASSACHUSETTS.

The following data are taken from the Annual Reports of the Massachusetts State Board of Health: 1911, page 384, and 1912, page 252.

The tables show that of the 202 places which had populations of less than 2,500 in 1910, 29 per cent. were provided with public water supplies, and 96 per cent. had no sewerage systems. Of the 48 places which had populations between 2,500 and 5,000, 85 per cent. had public water supplies and 75 per cent. had no sewerage systems. Of the 104 places which had populations of 5,000 or more all had public water supplies, and 20 per cent. had no sewerage systems.

The following figures show the number of water supplies and sewerage systems in the state arranged according to the population groups:

NUMBER OF PUBLIC WATER SUPPLIES AND SEWERAGE SYSTEMS IN MASSACHUSETTS.

Population, 1910.	Number of places provided with				Total number of places.
	Water supply.	No water supply.	Sewerage system.	No sewerage system.	
Under 500	0	39	0	39	39
500- 1,000	6	41	0	47	47
1,000- 1,500	19	31	4	46	50
1,500- 2,000	12	21	2	3	33
2,000- 2,500	21	12	2	31	33
2,500- 3,000	12	2	2	12	14
3,000- 3,500	8	1	4	5	9
3,500- 4,000	5	2	3	4	7
4,000- 5,000	16	2	3	15	18
5,000- 10,000	49	0	29	20	49
10,000- 25,000	30	0	29	1	30
25,000- 50,000	13	0	13	0	13
50,000-100,000	7	0	7	0	7
100,000-	5	0	5	0	5

Summary.

Under 2,500	58	144	8	194	202
2,500- 5,000	41	7	12	36	48
5,000- over	104	0	83	21	104

List of places in Massachusetts with populations higher than 2,500 which are provided with water supplies but have no sewerage systems:

<i>Place.</i>	<i>Population in 1910.</i>	<i>Place.</i>	<i>Population in 1910.</i>
Weymouth.....	12,895	Monson.....	4,758
Amesbury.....	9,894	Millbury.....	4,740
Danvers.....	9,407	Uxbridge.....	4,671
Braintree.....	8,066	Provincetown.....	4,369
Saugus.....	8,047	Randolph.....	4,301
Bridgewater.....	7,688	Dudley.....	4,267
Marblehead.....	7,388	Rockport.....	4,211
Whitman.....	7,292	Wareham.....	4,102
Rockland.....	6,928	Foxborough.....	3,683
Stoughton.....	6,316	Agawam.....	3,501
Reading.....	5,818	Dracut.....	3,461
Ipswich.....	5,777	East Bridgewater.....	3,363
Grafton.....	5,705	Oxford.....	3,361
Winchendon.....	5,678	Falmouth.....	3,144
Blackstone.....	5,648	Barre.....	2,957
Abington.....	5,455	Pepperell.....	2,953
Wellesley.....	5,413	Westport.....	2,928
Mansfield.....	5,183	Westford.....	2,851
Easton.....	5,139	Holbrook.....	2,816
Needham.....	5,026	Ayer.....	2,797
Chelmsford.....	5,010	Holliston.....	2,711
Hingham.....	4,965	Medway.....	2,696
Lexington.....	4,918	Manchester.....	2,673
Walpole.....	4,892	Cohasset.....	2,585
Canton.....	4,797		

List of places in Massachusetts with populations higher than 2,500 which have neither public water supplies nor sewerage systems:

<i>Place.</i>	<i>Population in 1910.</i>	<i>Place.</i>	<i>Population in 1910.</i>
Barnstable.....	4,676	Tewksbury.....	3,750
Dartmouth.....	4,378	Sutton.....	3,078
Warren.....	4,188	Somerset.....	2,798
Templeton.....	3,756	Norton.....	2,544

SEWAGE DISPOSAL IN MASSACHUSETTS.

	<i>Number of Places.</i>
Sewerage Systems.....	103
Sewage discharged into Boston Harbor through the main sewers of the Boston and Metropolitan system.....	24
Sewage discharged into the sea by independent outlets.....	15
Sewage discharged into inland streams without treatment.....	32
Sewage treatment works with effluents discharging into the sea.....	0
Sewage treatment works with effluents discharged into inland streams	32

SCARLET FEVER.

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Read before the Massachusetts Association of Boards of Health, Boston, July 30, 1904.

Before such a body as the present, the subject, scarlet fever, is too well known to have an interest except in certain phases. The scientific knowledge of scarlet fever remains today nearly the same as a generation ago; but slight fruition has rewarded the workers in this field. Views of some of the phases of the subject, however, have changed considerably and it is largely to these and to a brief review that I shall direct attention.

ETIOLOGY.

The theories of the causation of scarlet fever have embraced each possibility suggested by the advance of bacteriology: first, bacteria; second, protozoa, and third, filterable virus or ultramicroscopic organisms.

Many bacteria have been described in the past in scarlet fever, some supposedly specific. They have narrowed down, however, to the streptococcus. Streptococci are found in the throat in practically all cases and in the septic complications of the disease. Most of the serious complications and a large majority of the deaths are unquestionably due directly to the streptococcus.

The Russian investigators claim to have secured marked immunity by streptococcus vaccines. On the other hand, the most careful bacteriological studies have failed to demonstrate a streptococcus specific for scarlet fever. Immunity produced by known streptococcus infections is very slight, while immunity to scarlet fever from one attack is very marked. The weight of evidence is against the organism being the cause, although more knowledge of the streptococcus group is needed.

Next, the possibility of a protozoan cause was considered and protozoön-like bodies described by Mallory, Duval, Siegal, Prowazek, Gamoleia and Schich and Rach supported this theory. Some investigators have failed to substantiate this work. Sufficient evidence is not at hand upon which to base a decision as to their etiological relationship to the disease.

The latest theory has been the ultramicroscopic virus. Bernhardt claims experiments in monkeys have shown positive inoculations with bacteria-free filtrates. Many have failed to inoculate monkeys by any method, however, and conclusive proof is still wanting. The cause, therefore, remains in doubt, but it is true that the facts regarding the epidemiology of scarlet fever and of diseases known to be caused by filterable viruses agree.

DIAGNOSIS.

No part of the subject has the practical importance today that diagnosis presents. Our whole scheme of control depends on proper diagnosis. Several more or less new signs have been reported.

Pastia's sign consists of a stain at the elbow fold having a mahogany-brown color fading through shades of brown. It is most intense in the severe cases and is present in a majority during the rash. It persists for a few days to at times one or two weeks. This sign may be absent in the mildest cases and is found at times in other conditions as toxic erythemas.

Rumpel-Leede's sign, or the tourniquet sign, is produced by the application of a tourniquet or a constricting band as an arm band of a blood pressure apparatus to the upper arm. Sufficient pressure must be obtained to produce a passive hyperæmia without shutting off the pulse. In most cases of scarlet fever in two to five minutes a distinct petechial eruption appears at the fold of the elbow consisting of minute pinpoint spots. This sign is present in practically all cases of scarlet fever while the rash is present. It may occur after the rash for several weeks in some cases. It is also present in many other erythemas, simulating scarlet fever, particularly in multiform erythema and other toxic erythemas.

Schich has drawn attention to a sign produced by pinching the skin as of the abdomen between the thumb and finger when a small ecchymotic spot occurs.

These three signs depend on the well known tendency in scarlet fever to petechial eruptions. In all the severer cases, these petechiae occur spontaneously or in response to slight trauma and not infrequently in mild cases but are so minute as to escape attention unless care is taken in examination. Unfortunately the conditions simulating scarlet fever most difficult of differentiation, as the toxic or septic rashes, often have this same peculiarity.

Inclusion bodies in the polymorphonuclear leucocytes were described by Dohle and have been studied extensively. They appear early and are found in most cases of scarlet fever during the stage of rash. They appear stained by ordinary stains as methylene-blue and Wright's stain as small, pale, irregular, rounded, oval or rod shaped bodies chiefly in the periphery of the cells. It is believed that they are degenerations of the protoplasm. These are found in other conditions, as diphtheria, at times, and especially in streptococcus infections. Although supporting the diagnosis when found in the acute stage and throwing some doubt on scarlet fever if absent at this stage, they are not specific.

These recent signs have, therefore, not changed the status of diagnosis notably. Accurate diagnosis is still a matter of clinical experience and skill.

For clinical diagnosis, we have the great triumvir of signs—the throat,

tongue and skin changes, which are too well known to require discussion here. Vomiting, the fever course, mouth pallor, the type of onset and involvement of the glands are of some value, but vary too much for dependence to be placed on them. History of exposure and the presence of albuminuria are worse than useless in my experience.

This consideration, it is seen, deals solely with the early stage. Unfortunately, after the acute stage is passed, diagnosis is always more difficult. Desquamation is a most unreliable sign, not infrequently absent when scarlet fever is present, and present when the patient does not have this disease. It varies greatly in degree, time of appearance and duration. I make it a practice never to diagnose scarlet fever on desquamation alone. Other signs must be present, preferably those of the throat and tongue, but at times *when satisfactory*, a history of the course of the illness may be accepted. I desire to emphasize the importance of making the diagnosis in the acute stage and the folly of holding the diagnosis in abeyance in that stage to await later desquamation as a conclusive evidence. There is no specific type of desquamation. In case the signs in the acute stage are insufficient, or the patient was not seen at that stage, he should be held as a suspect until the danger of contagion, if scarlet fever had been present, has passed.

Further knowledge of diagnosis is greatly demanded. Without question one of the great stumbling blocks to better control of the disease is the missed cases. Experience shows these may be due to three causes: (1) stage of medical knowledge of the disease, (2) failure of parents to carefully observe their children and to have them examined when slight illnesses occur, and of adults to consult the physician in similar circumstances, and (3) mistakes of physicians due to careless methods of examination or to personal ignorance. The latter two are by far the more important and improvement in control requires that great improvement occur in both directions. This is a problem for education and social service.

DIFFERENTIAL DIAGNOSIS.

I wish to speak of only two diseases for differential diagnosis: rubella and sepsis. Rubella sometimes so closely simulates mild scarlet fever as to be practically indistinguishable. Usually rubella may be recognized by the early involvement of the face, the rapid progression of the rash and its more discrete and blotchy character, the absence of throat involvement and the more marked glandular involvement, especially of the post-auricular glands, which are enlarged in about 90 per cent. of the cases. The mucous membrane lesions of rubella consist of slight redness of the mucous membranes rarely and a fine discrete red rash on the soft palate and buccal mucous membranes, both of which are early and transient.

Septic conditions, as well as intoxications of various sorts, as drugs,

burns, and protein intoxications, etc., give rashes at times practically indistinguishable from scarlet fever. Differentiation must be made, chiefly, by a consideration of the lesions of mucous membranes. The diagnosis of septic throat with a septic scarlatini-form rash is unjustifiable, I believe, as all such cases coming to my attention have proved to be scarlet fever.

MANNER OF SPREAD.

The evidence as to the manner of spread has never been more clear or the views more reasonable. One must consider: first, point of exit of virus from body; second, the viability of the virus outside the body; third, the manner of transfer of virus; and, fourth, the portal of entry, including invasive power and virulence of the virus and the resistance of the patient.

Evidence as to the point of egress of the virus has come largely from a study of return cases following discharge from isolation, particularly from hospitals. Previous views have held to the contagiousness of the epithelium. The evidence was largely the supposed coincidence of the periods of desquamation and contagiousness. This conclusion seems to have come from the well recognized experience that cases developing scarlet fever in contact with other children usually did not transmit the disease if isolated at once, while when desquamating cases had associated with others, contagion often occurred. This, however, entirely overlooked the important difference of degree and duration of contact in the two conditions. Besides many experiences have shown that cases, although desquamating, have not transmitted the disease.

If we have time, I might speak of one illustrative case, that of a child who was admitted to a surgical ward with a diagnosis of abscess of the neck and remained in this ward with, I think, eleven or twelve other children for a week before the scarlet fever was recognized. He was desquamating. He was quite sick. He had a septic throat and a very severe abscess of the neck, and was not, of course, under conditions which brought him in close contact with other patients in the ward, many of whom were quite ill but others of whom were convalescing. None of these children developed scarlet fever, but the nurse, an adult, who theoretically should have more immunity, contracted the disease. It was her duty to change the poultices on this child's neck and handle the patient, especially the discharges from the wound, rather intimately, and without the knowledge of their contagiousness and therefore probably without the precautions she would have taken, had she known that the patient had scarlet fever. The patient's brother, by the way, was at this time taken sick with scarlet fever at home. I have known several cases where the disease was transmitted before desquamation occurred and many cases where it was transmitted after the scarlet fever desquamation, so far as we can speak of such a thing, had

long passed. Hospital experience especially shows that the disease is not spread particularly by air currents, although the powdery desquamation must be easily disseminated. On the other hand, contagion clearly lingers where there remain unhealed areas of the body surface either cutaneous or mucous. Lesions of the nose and nasal mucous membranes have been most frequently a source of contagion, probably because the discharges from this region are so readily spread about. Aural discharges, discharges from paronychias, abscesses, abrasions, sinuses, etc., are less frequently a source of danger and seem to vary according to the facility with which the discharge may be transmitted freely. Ex. g., a sinus covered by a surgical dressing and properly handled in changing so that no discharge may get about, seems to be safe to others. I do not believe that all cases having lesions of this group are a source of danger but it is impossible at present to certainly distinguish the dangerous and the non-dangerous ones.

Evidence is lacking as to the infectiousness of the excreta.

Viability of the virus outside the body is extremely difficult to determine and our evidence is based on clinical experience with human beings. Where scientific controls cannot be secured, how unreliable such evidence is likely to be is well instanced in the earlier history of yellow fever and malaria. In general, we have some reason to believe that under good conditions of light and air and drying the virus rapidly dies perhaps in hours or days. It is probable that under suitable conditions of gross contamination and exclusion of light, heat and fresh air, infectious material may remain viable and virulent for days or weeks. Whether the virus may remain viable and virulent for many months as often believed, may be doubted but proof either way is slight.

Manner of transfer of virus is clearly by transmission of infectious matter from one person to another, an intermediate host not being required. This transfer may be effected either by direct contact between the case or carrier and the victim, or by indirect contact through infected objects, particularly dishes, drinking glasses, handkerchiefs, towels, pencils, candy, chewing gum, etc. Direct contact is the more important and the more frequent cause of transfer. The disease may also be transmitted by food supplies as milk, a form of indirect contact. Under occasional conditions it may be transmitted by droplets thrown out in coughing or sneezing or spitting. This is not an important manner of spread epidemiologically as the disease is not attended by coughing and sneezing usually as are measles and whooping cough. Flies may spread the disease but they, also, do not play a large rôle in the prevalence as the curve of incidence does not correspond at all with the prevalence of this insect. The disease is not spread by air except as given above.

The portal of entry is not known, but suspicions point to the mucous membranes of the throat and nose, possibly, but not probably, to the gastro-

enteric tract and lungs. The uninjured skin is a practically impervious barrier to infection. It is probable that a normal and intact mucous membrane is likewise a fair barrier to infection, but slight lesions and trauma are so common and moisture and warmth are so favorable to infection that no great dependence can be placed on this protection. Wounds, burns and punctures of the skin probably allow entrance of infection, as frequently shown by the disease following these conditions, in nurses and doctors, etc., but this cannot be proved as the ordinary channel cannot be excluded.

The invasive power of the virus and the resistance of the individual are unknown. Immunity, as we use the term, includes all these factors. It seems certain that early infancy, as well as adult life, is more immune than childhood. Part of this apparent immunity is probably due to modes of life which do not bring infection frequently or intimately to the individual. This is shown by the higher adult incidence in milk-borne epidemics. Nurses at the South Department contract scarlet fever in less than 3 per cent. The medical students contract the disease in a small fraction of a per cent. The incidence among children is given at from 25 per cent. to 50 per cent. or more. The medical students give a history of having had the disease, chiefly in childhood, in about 20 per cent. I believe that a large majority of people, probably 75 per cent., escape the disease. The low incidence among nurses suggests that immunity has come with adult life, but it must be acknowledged that suitable technique may prevent infection in many nurses who are not immune.

DURATION OF CONTAGIOUSNESS.

The difficulty of ascertaining this point leads to many friendly differences, and sometimes otherwise, in the management of scarlet fever cases. We must admit that one cannot prove that any individual still harbors the virus in a transmissible condition or that he is free from it except by watching the result of exposure of susceptible people. Patients may leave the hospital, moreover, harboring the contagion, but because of good personal hygiene and mode of life may not transmit the disease. On the other hand, patients may be free from transmissible contagion on leaving and develop a sore nose or a discharging ear later and become infectious again. Presumably in these cases the virus has been held in the tissues and with certain conditions as another infection such as a "cold," is washed out so as to be transmitted. Clear analogy to this is well known in diphtheria.

There is abundant clinical evidence that contagion may persist in an individual who has had the disease for many weeks, as long as twenty at least. However, it seems equally clear that some cases are a source of danger for a very short time, possibly for a week only but a sufficiently large per cent. remain infectious for four to eight weeks to make the arbitrary

minimum between these points. The longer it is, the surer will there be safety, other things being equal.

Lesions of the cutaneous surface and especially mucous surfaces of the body bear a clear relationship to contagion and should be healed before release of the patient. It is possible for a patient with a sinus who can be depended on to avoid touching the dressing so as to spread the discharge to be released and the wound dressed with special precautions. It is frequently held that crowding patients together increases the infectivity of the individuals. This is held to be due to reinfection of convalescent cases. I am not convinced that such is the case. Certainly in diphtheria and typhoid carriers, the condition seems to occur because of some peculiarity of their tissues and not because of repeated reinfections. I believe, though the evidence is slight, that this is true for scarlet fever. Crowding is very bad for infectious cases, however, and delays tissue repair in children without question and in this way may increase the duration of infectiousness.

My experience has not at all suggested that the association of mild and severe cases influences the course of the disease; if mild, the disease remains mild as frequently when in association with severe cases as when not.

METHODS OF CONTROL.

Three methods of control are open in dealing with scarlet fever: 1, production of immunity; 2, destruction of infectious cause; 3, prevention of transmission through restrictions of individuals. All three have been used or attempted but in the degree tried none has proved efficient as yet in control of the disease.

1. *Immunity.* So called natural immunity has increased apparently in the past fifty years. The mortality percentage is lower and fewer instances of multiple deaths in one family occur. Whether efforts of control have been instrumental in this result, or whether it has come from changes in the host and his mode of life and hygiene or from changes in the infecting organism can be hardly more than conjecture. Probably all three have been factors.

Attempts at artificial immunity through inoculation, attempted years ago, have been failures, as the inoculated disease did not prove milder, as is the case in smallpox. The use of streptococcus vaccines by Gabritschewsky and others has been attended by rather marked results. Vaccinated persons contracted the disease in from 0 to 8.5 per cent. in different villages as contrasted with 13.3 per cent. to 70.6 per cent. in unvaccinated. Of ninety-one vaccinated persons reported by Smirnoff, 37.3 per cent. developed scarlet fever as contrasted with 3.93 per cent. of 127 vaccinated. More evidence is needed on this point. I am skeptical. It is possible that other factors not controlled, as type of individual who might come for vaccination, might

be responsible. Some of the vaccinated cases also had sore throats, rashes, etc., indistinguishable, I believe, from scarlet fever, but this was put down to the vaccines and not counted as scarlet fever. It must be recalled that streptococcus diseases, as erysipelas, do not give so high an immunity by any means as occurs in scarlet fever. The streptococci also have not been identified as specific for scarlet fever.

Whether immunity may be secured by general hygiene is doubtful, but I believe that some protection may be secured by good care of the teeth, gums and throat to preserve cellular layer of the mucous membranes.

2. *Destruction of the Infecting Organism*, by gaseous disinfection, scrubbing and germicidal solutions has been extensively practiced. As the only reservoir of the disease, so far as we know, is the human body, this has to be limited to the destruction of the organisms thrown off from human beings. This is by no means an easy matter practically. Much criticism has arisen against this method and certain phases in particular. Two factors must be considered in this problem: first, whether disinfection is required, *i.e.*, whether any material remains in the suspected areas capable of producing the disease and second, whether remaining viable contagion is destroyed by the method used and the parts of the patient's surroundings that have been treated. For example, following measles, mumps, and usually whooping cough, no viable contagious material would be present in a day or so, and by the time the patient had recovered, all organisms outside the body would have died. And even in diseases like scarlet fever and diphtheria, in cases of clean habits and a knowledge of the principles of personal hygiene and asepsis, no contagion would be spread about so as to transmit the disease.

On the other hand, where gross contamination with infectious secretions of scarlet fever and diphtheria had occurred, an efficient germicide might be applied to only part of the infected objects or to unimportant objects, such as disinfecting the bedroom when the kitchen was by far more infected and dangerous. Analysis of practical results of home disinfection have not shown any real value from this method. The evidence suggests, however, that there is a possibility of scarlet fever contagion persisting for some time, although probably less than usually believed, and that therefore efficient disinfection is indicated as a safeguard. Mechanical cleansing and the application of efficient germicides as cresols and phenol to the infected areas should be done. Attention should be given especially to objects likely to be contaminated by secretions, as basins, bedside tables, chairs, eating and drinking utensils, tooth brushes, and bathroom and kitchen, if patient has been to these places. Walls, ceiling, closets and drawers are much less or not at all to be considered as a source of danger. Formaldehyde gas under the conditions requiring disinfection in homes is often useless because proper application is not possible.

Disinfection, finally, as a means of control, falls short, even if all organisms outside the body were killed by it, in that the organisms persisting in the tissues of the host are not reached. We would need a specific drug as salvarsan in syphilis, or better, to render the human body free from the danger of spreading the disease. When the infection is in milk, it can be destroyed, of course by pasteurization or boiling. One cannot pass over the great bacteriacidal action of fresh air and sunlight, biologically more important in the destruction of pathogens than all our puny efforts. Scarlet fever patients as well as their surroundings may well be exposed to these conditions as a means of disinfection as well as for the clinical benefits to the patients with this disease.

3. *Prevention of Contact.* First, through restrictions of all cases or carriers of the disease and, second, restrictions of healthy people who may have been in contact, in a disease spreading as slowly as scarlet fever, prevention of contact should be of great value in control but proof is however not very conclusive that this has been so. Failure must be laid to, (1) insufficiently early isolation; (2) imperfect isolation through faulty methods or imperfectly carried out; (3) too short isolation, and (4) missed cases. This method is our most promising one at this time and it should be more efficiently applied. The net must have no hole, the chain no weak link, to make it a success.

Restriction of well persons is being given up. On a large scale it passed with a better knowledge of yellow fever and a greater certainty of the efficiency of vaccination in smallpox. It probably will never return, except under very unusual conditions. In scarlet fever, restriction of well adults should be limited to those who handle food supplies, as milk, and who come from houses where the disease is present and likely to contaminate them. Adults, especially males, so rarely develop the disease in families where children are ill, that shutting them off from their labors, as carpentry, and all outdoor work, not especially offering contact with food or children, is unnecessary. This is, however, frequently practiced in small communities in Massachusetts.

Children who have been exposed or where exposure may continue should be restricted as far as possible from intimate contact with other children and should be kept out of school until danger of developing the disease is passed.

Closure of schools because of the disease developing therein is of little value, because it is not closed sufficiently long for the carrier or missed case to become harmless and because contact at home or in the neighborhood is likely to introduce the disease again through mild or missed cases. Besides, experience shows that by repeated careful inspections by experts and exclusion of the suspects and new cases as they arise, the disease may be speedily eliminated from the school.

Prevention of spread may be aided by proper education without restrictions of the activity of persons. Education of people, through social service and other ways, to avoid the spread of nose and throat secretions, by care with towels, handkerchiefs, by precautions as to eating, sleeping, playing together of children, would do much to prevent the transmission of the disease.

Communities may well obtain better results than the present if the known methods of control are applied more completely and intelligently.

DISCUSSION.

A MEMBER: I would like to ask about the period of incubation of scarlet fever.

DR. PLACE: That is so much disputed, and we have so little evidence, that I did not speak of it, largely because I don't think it is of any great practical value. Personally I believe with McCollom that the incubation period varies greatly, and that it is often longer than a week, although I don't think the average case is longer than a week. Dr. McCollom puts the extreme period as long as eighteen to twenty-one days. That is not, however, usually accepted. Generally the incubation period is accepted as from a few days to a week. I have seen many cases, isolated, so far as we know, completely from further exposure, who have developed the disease over a week after the last known exposure. But always there is a chance of a break somewhere; the patient may have been exposed in the interim that you did not know about.

THE RELATION OF BIOLOGIC THERAPY TO PUBLIC HEALTH.*

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Read by invitation before the New Jersey Association of Health Officers at Paterson, May 27, 1914.

We live in an age of wonders and of progress. The conditions of yesterday are lost sight of in the amazing progress of today. So great have been the advances of scientific knowledge in the last fifty years that one is now prepared for almost anything. Not only is progress astonishing in the scientific world, but in commercial matters as well. Business enterprise today uses the worthless by-products and waste material of yesterday. The fact that the squeal of the pig is the only thing that goes to waste in the modern stock yards has long since passed into the realms of commonplace. A careful consideration of biologic therapy reveals the fact that it involves almost all of the great biologic principles. These may, however, be grouped under two headings: *infection* and *immunity*. Neither of these fields has any well-defined limits. In the elaboration of research in them, one is led into still greater problems of biology, such as laws of inheritance, specie characteristics, mutation of species; and, upon the side of the infected host, there are almost all of the great problems of physiology and pathology.

Living bacterial cells must form ferments to prepare their food for absorption; hence, as ably set forth by Vaughan, for a given bacterium to be poisonous to the human subject, it must have the ability to split up and feed on the proteins of the human being, otherwise the bacterium cannot grow and cannot harm the host. Another prerequisite to such poisons is that the ferments in man must not be immediately destructive to the invading bacterium, although antibodies may be ultimately formed in sufficient amounts to destroy it. Therefore, a bacterium, able to digest the proteins in man, renders the host susceptible to its poisoning, unless the individual has been protected either by a previous infection from the specific bacterium, or by previous inoculation or vaccination with the germ or its products, which so promotes the formation of antibodies or anti-ferments that it renders the individual immune. This is the scientific basis of vaccination and protective inoculation.

Active immunity follows an attack of a certain disease and secures immunity for that alone; or it follows inoculation with a virus weaker than necessary to cause the typical disease; or it follows inoculation with bac-

*From the Lederle Antitoxin Laboratories, New York.

terial products or solutions of the killed organisms themselves. Passive immunity takes place as a result of the introduction of immunizing substances that have been prepared by actively immunized individuals or animals. This is usually conferred by the injection of blood serum from immunized animals.

ACTIVE IMMUNIZATION.

As directly related to our topic, we shall discuss, under active immunization, those diseases in which the causative agent is an ultra-microscopic protozoan, or a so-called filterable virus; and those diseases caused by specific bacteria and in which bacterial vaccines are employed to produce immunity.

Smallpox. Led by the popular belief that individuals who had accidentally become infected by cowpox were thereby protected against smallpox, Jenner put this to a test in 1796. To this end, he inoculated a healthy boy, eight years old, with material taken from a cowpox vesicle on the hand of a dairy-maid and, a couple of months later, showed by inoculation with smallpox virus that the child was actually immune.

At that time, smallpox was the cause of 184 out of every 1,000 deaths from all causes in London. In 1909, in our own registration area, smallpox caused 1 in every 10,000 deaths; in New York City, but 1 in 20,000. This change has been accomplished by vaccination, not by increased excellence of sanitation; for now, under the same sanitary circumstances, the vaccinated, especially if recently vaccinated, are almost 100 per cent. immune, while the unvaccinated are uniformly infected when exposed, and their death-rate runs from 30 to 50 per cent. as against 2 to 6 per cent. for persons who have ever been vaccinated.

Niagara Falls has been going through an epidemic, this winter, of proportions so large that, if it had occurred in New York City, there would have been 65,000 cases. This epidemic arose in spite of the growth of sanitation, merely because a misguided fanatic, writing anti-vaccination literature, had turned the tide of public sentiment away from vaccination and the community was literally "dry timber" for the conflagration that started.

Trivial and simple as the operation of vaccination appears, it is, nevertheless, a surgical procedure and one requiring skill and special knowledge to secure the most successful and satisfactory results. Moreover, the after-care of the wound is exceedingly important. *We cannot emphasize too strongly the fact that large scarifications should be avoided, as they easily become infected and lead to complications.*

Vaccination and re-vaccination systematically and generally carried out confer complete protection to a community or a nation. On the average, definite protection lasts about seven years. The laws and regulations relating to vaccination in the several states of America show marked lack

of uniformity. Compulsory general vaccination can be said to exist by law only in Kentucky, Rhode Island, and Porto Rico. The world may learn a valuable lesson from the splendid results obtained in Germany through compulsory vaccination and re-vaccination.

Rabies. While the actual principle underlying the preventive vaccination against smallpox was scarcely recognized by Jenner and his contemporaries, their work nevertheless constitutes the basis of all modern vaccine work. To it may be attributed the successful preventive treatment of another prevalent disease, namely, rabies, sometimes erroneously designated hydrophobia. We owe the discovery of this treatment to the genius of Pasteur.

The disease can be prevented by enforced muzzling of dogs, and there has not been a single case in England since the muzzling law went into effect in 1902. Australia has never had the disease, but this is due to its efficient quarantine against animals. During the year 1912, there were more than 4,000 cases of rabies in this country.

Rabies may result from the bite of an animal apparently normal at the time of inflicting the wound. Therefore, any animal suspected of rabies should be securely confined and kept under observation, but antirabic treatment for the bitten individual should be started at once and the wound of the patient should be cauterized as soon as possible.

The principle of Pasteur's antirabic treatment consists in producing an active immunity in the bitten individual, by means of an attenuated virus, within the incubation period—that is, before symptoms of the disease have appeared. The mortality from rabies, which formerly ranged between 14 and 16 per cent., has been reduced to less than 1 per cent. under Pasteur's vaccination treatment.

Typhoid. The prevalence of typhoid fever in practically every section of the United States makes any measure which will protect the individual, or assist in preventing the spread of the disease, of importance to health authorities and of general interest.

Typhoid vaccination was begun voluntarily in the United States Army in 1909, the death-rate per thousand that year being .28 among the enlisted men. Vaccination was made compulsory in 1911 and the death ratio per thousand dropped to .03 in 1912. In 1913, the death-rate from typhoid fever was 0, the number of cases per 100,000 being three.

What, if any, has been the effect of typhoid vaccination on the rates for tuberculosis? We find in the Surgeon General's Annual Report that not only has tuberculosis *not* increased since the introduction of typhoid vaccination, but that it has actually *decreased*, a result due no doubt to improved sanitation.

The question of sensitized vaccines has recently become important. In the United States Army, over three hundred thousand men have been

vaccinated and the statistics prove conclusively that vaccination with killed cultures *does* give almost absolute protection. In view of this fact, Major Russell of the Medical Corps, feels that there is no necessity for using sensitized vaccines, either living or killed, to secure greater protection.

As to the harmlessness of typhoid prophylactic vaccine, no more convincing evidence is needed than the fact that in the United States Army and Navy, up to the present time, no bad results have been reported.

Of particular interest and importance are the investigations of Firth regarding paratyphoid fever. Bacteriological tests made upon many cases of apparent typhoid which did not respond to treatment have frequently demonstrated a paratyphoid infection masquerading as true typhoid. This fact points to the necessity of employing for prophylaxis a vaccine containing both the typhoid and paratyphoid bacilli, and there can be little doubt that this procedure will rapidly gain in favor as it becomes more widely known.

Gay and Force have found that a preparation of the typhoid bacillus in 5 per cent. glycerin-broth, when applied to the skin by the von Pirquet method, produces a clean-cut reaction in 95 per cent. of persons who have had typhoid fever. In view of its simplicity, this test may prove to have practical value in determining whether persons, who have had typhoid fever, or who have been inoculated with typhoid vaccine, are protected against the disease. It may be that eventually a negative skin test in those who have been inoculated with the vaccine will prove an indication for reinoculation.

Scarlet Fever. The first work in scarlet fever prophylaxis with vaccines was done by Gabritschewsky in 1905. Nearly all the published accounts are in Russian, so that the method has attracted comparatively little attention of the profession generally; but the results are sufficiently substantiated to warrant a wider trial.

It is claimed that after three injections of the vaccine, and usually after two, a complete immunity, which probably remains at least one and one half years, is established against scarlet fever. Yemelyanoff used the prophylactic vaccines in an epidemic in Kharkow. Six hundred and ten people were inoculated and not a single one contracted the disease. Zelikin used the vaccine in country practice where there was a severe epidemic and, among 613 people who received two injections of the vaccine, none had scarlet fever. From these published accounts, it would seem that streptococcus vaccine, as advocated by Gabritschewsky, is destined to control epidemics of scarlet fever; and this method should be given wider application in this country.

Meningitis. The value of antimeningococcus serum as a curative agent for epidemic cerebrospinal meningitis is well known to every physi-

cian, but the prevention of this disease by immunization with meningococcus vaccine has only recently been given serious consideration. Sophian and Black carried out their experimental prophylactic vaccination on eleven students in the Southwestern Medical College at the end of the Texas epidemic. Black subsequently carried out complement fixation tests on eight of the original students, and was able to demonstrate immunity at the end of one year as a result of the prophylactic vaccination. More recently, Major Wadham, United States Army, successfully vaccinated 600 people during an epidemic of meningitis at Deckerville, Ark., following the floods in the Ohio and Mississippi valleys. He was able to check the epidemic absolutely, and no new cases appeared in the community. The serious nature of the disease should render prophylactic immunization a procedure to be adopted during every epidemic.

Whooping-Cough. More than 10,000 children in America die every year from whooping-cough. Under one year of age, the mortality from this disease is 27 per cent. It has recently been demonstrated that the specific causative agent of whooping-cough is the Bordet bacillus, discovered by Bordet and Gengou in 1900. Early in the course of the disease, this bacillus is present in large numbers; but later it is associated with other microorganisms, the presence of which favor the development of bronchopneumonia, which so frequently causes a fatal termination of this widespread disease. While the reports of clinicians in regard to the use of pertussis vaccine have not been numerous, nevertheless they have been invariably favorable and have proven conclusively the value of the vaccine in this disease. Moreover, the reports have always shown absolute freedom from harmful effects, even in very young babies. Clinicians, who have used pertussis vaccine in large numbers of cases of whooping-cough, report that this vaccine, when used as a prophylactic agent, will absolutely prevent the disease. The immunity is of uncertain duration, but probably lasts for at least six months. When used during the progress of the disease, pertussis vaccine diminishes the number and severity of the paroxysms, and shortens the course of the disease. Uncomplicated cases which usually run a course of nine to twelve weeks, have been reduced to about four weeks under vaccine therapy.

PASSIVE IMMUNIZATION.

Passive immunity may be induced by the use of antitoxic serum, which neutralizes the bacterial toxin, as illustrated in the use of diphtheria antitoxin; or by antibacterial serum, which acts directly upon the invading organisms and renders them inert or destroys them, as in the use of antistreptococcus or antipneumococcus or antigonococcus serum. As the antibacterial serums are not employed in prophylaxis, we shall confine ourselves to the antitoxic serums.

Tetanus. Compared with the major plagues of man, lockjaw has always been a rare disease. On account of the great resistance to the tetanus spores, they are blown about in dust and spread everywhere by dirt and manure. Some parts of Long Island and New Jersey have become noticeable for the number of cases of tetanus caused by small wounds. The wounds produced by blank cartridges and Fourth of July accidents are especially likely to develop tetanus. The disease sometimes occurs as a complication of vaccination. In these cases, however, the tetanus spores are not contained in the vaccine virus, but subsequently enter the wound through lack of proper care. In many hundreds of special examinations made in the Hygienic Laboratory at Washington, tetanus spores have not been found in a single vaccine virus.

Tetanus antitoxin is a valuable, reliable, and efficient preventive. Its use, however, must be thoroughly understood in order to achieve satisfactory results. It must be administered before the advent of symptoms of the disease for, after the tetanus toxin has combined with the motor nerve cells in the central nervous system, it cannot be displaced or neutralized with antitoxin. The reliability of tetanus antitoxin as a prophylactic measure is shown in the statistics collected by the United States Public Health Service. Not a single case, in which antitoxin was administered within ninety-six hours after the injury, developed tetanus.

The immunizing dose agreed upon by a committee of American bacteriologists as sufficient to protect against the development of tetanus within the incubation period is 1,500 units of American standard. It is important to remember that the antitoxin is eliminated from the system in the course of about ten days. Hence, in cases where the wounds are extensive and where it is impossible to thoroughly cleanse the wounds, it is advisable to give a second prophylactic injection of antitoxin at the end of ten days.

Diphtheria. The prompt and early diagnosis of diphtheria has now become one of the routine measures of board of health laboratories. Especially commendable is the general practice of refusing to lift the quarantine until two successive cultures prove negative. Individual cases may be protected against diphtheria by the use of diphtheria antitoxin. The protection is absolute for ten days. The injection should be repeated if danger of infection persists longer than two weeks.

During the year 1902, the average mortality from diphtheria, in cases where antitoxin was not used, was $32\frac{1}{2}$ per cent. During the same year, the average mortality in the cases in which antitoxic treatment was employed was only 6.48 per cent. This means that the death-rate from diphtheria was reduced more than three-fourths by the use of antitoxin.

One of the objectionable features in the administration of a large number of units of unrefined antitoxic serum was the volume necessary to inject, in order to convey the antitoxin. Another was the annoying, resultant

rashes of an urticarial or erythematous type in so large a percentage of the cases. The use of the refined and concentrated antitoxin in over 5,000 cases, treated in the New York City Health Department Hospitals, demonstrated that the number of rashes following the injections was reduced fully 50 per cent., and the constitutional disturbances were almost eliminated. The ease of administration and the added comfort to the patient in using the refined and concentrated product is readily appreciated from the fact that, by the process of refining, the volume of dosage of the antitoxin has been reduced to one-fourth that heretofore required in using the whole serum.

The experience of clinicians all over the world, involving many thousands of cases, reveals the fact that the doses of diphtheria antitoxin which were first administered, and which are often used at the present time, are quite inadequate to produce the desired effects. It is becoming more and more evident that the initial dose should never be less than 10,000 units, even when the patient is seen in the early stage of the disease; and, if there is a considerable amount of membrane, or if the infection is a virulent one, or, if progress of the disease has been rapid, it is probably best to employ not less than 50,000 to 100,000 units as the initial dose.

There has been frequent mention in the literature recently of anaphylaxis or serum-sickness, in connection with the use of diphtheria antitoxin. Serum-sickness has nothing to do with antitoxin, but is caused entirely by the foreign proteins contained in the horse serum. It may be produced with normal horse serum, as well as with antitoxic horse serum. The studies upon anaphylaxis have thrown much light upon the nature of this complication. Rosenau and Anderson have collected some nineteen cases of sudden death following the injection of horse serum. This unusual and serious complication comes on within five or ten minutes after the injection and is characterized by collapse, unconsciousness, cyanosis, labored respiration, etc. The entire picture is an exact counterpart of the anaphylactic shock so readily produced by a second injection of horse serum, or other foreign protein, into the guinea pig. This phenomenon was first described by Auer and Lewis and is attributed by these investigators to spasm of the smallest bronchioles, which virtually causes the suffocation of the animal. The serious symptoms and death in these cases are not due to any inert poisons in the antitoxic serum, but result entirely from a hypersusceptibility of the individual, whose tissue-cells split up the foreign protein of the serum into highly poisonous intermediary products, to which the toxic symptoms are due.

Most of the cases of anaphylaxis occur in asthmatics, or in persons who present a history of asthma or discomfort when about horses. This is a practical and important point, and should be inquired into before horse serum of any kind is injected. In order to detect the hypersusceptibility

of an individual, the method of Besredka may be applied. Thus, one or two drops of the serum may be first injected and, if no toxic symptoms appear after ten to fifteen minutes, when the injection is given intravenously, the individual may be said not to be hypersusceptible; if the injection is made subcutaneously, four hours must elapse before one can be sure that anaphylactic symptoms will not appear.

It has been observed that post-diphtheritic paralysis is more frequent since the use of antitoxin than before the days of serum therapy. This is due to the fact that many cases now recover that formerly would have died. It is also due to the fact that diphtheria antitoxin is sometimes used too late, thus neutralizing only the acute effects of the toxin, but not neutralizing the after-effects of the toxon, which acts specifically upon the nerves. Roemer and Viereck found that antitoxin in no way favors the onset of paralysis. The results of their researches favor the view, advanced by Ehrlich, that the remote paralyzing effect of the diphtheria bacillus is to be attributed to a so-called toxon, as distinguished from the primary intoxication caused by the toxin.

Von Behring's new procedure of vaccination against diphtheria has for its purpose the establishment of a prolonged active immunity to the disease. The method consists in the injection of a combination of diphtheria toxin and antitoxin so proportioned that, upon administration to guinea-pigs, the antitoxin almost or quite offsets the poisonous action of the toxin. The significance of von Behring's new discovery is obvious. Not the least of its practical results, it would seem, will be elimination of the bug-bear of horse serum anaphylaxis in connection with the preventive administration of antitoxins, to say nothing of the possible removal of the danger attending diphtheria carriers.

The successful handling of diphtheria carriers has an important bearing upon the public health. Various means have been devised and used from time to time to handle this problem, but most of them have been disappointing. The over-riding with broth cultures of the staphylococcus aureus would seem to offer the best solution of this problem. The results of the investigation conducted by the Iowa State Board of Health showed that in 15 out of 16 cases, the staphylococcus spray effectively cleared the throat of *B. diphtheria* after other methods had failed, and that apparently no harm results to the patient from the use of the spray.

Skin reactions have hitherto been employed almost entirely as aids to diagnosis. The field of prophylaxis is rapidly becoming more permanent and now some of these reactions are being used as guides in the application of prophylactic measures. In many persons, the blood normally contains diphtheria antitoxin in readily demonstrable quantities. There are good reasons for believing that such persons are not susceptible to diphtheria and, if this is true, the prophylactic injection of diphtheria antitoxin

might be omitted in many cases, provided it were possible to promptly detect the persons having natural antitoxin. A practicable method for this purpose appears to be available in the intracutaneous injections of minimal quantities of diphtheria toxin. Such injections are followed in a few hours by a definite reaction of local redness and infiltration of persons devoid of antitoxin, while persons having natural antitoxin in the blood, as a rule, give no reaction whatever of this kind. Schick, working in von Pirquet's clinic in Vienna, observed that, among the nurses, those giving the reaction are likely to contract diphtheria. Systematic observations by several workers indicate that, according to the results of the intracutaneous injection, 93 per cent. of the new-born are protected; 57 per cent. of children in the first year; 37 per cent. of children between 2 and 5 years of age; 50 per cent. of children between 5 and 15. Presumably, adults are protected in still larger proportions. The test is very simple; the quantity of toxin injected is one-fiftieth of the minimum lethal dose for the guinea-pig, and this is diluted so as to represent 0.1 cc. of fluid. The results are available at the end of twenty-four hours. This test seems easily adaptable to institutions of various kinds. When diphtheria breaks out, all of the inmates can be tested and only those who show inflammatory reaction need receive the prophylactic injection of antitoxin. In this way, much annoyance on account of serum reaction, as well as much expense, may be avoided. Like the typhoid skin reaction, the intracutaneous injection of diphtheria toxin is so easy of application that it will be accessible to all practitioners; and it is to be hoped that both of these cutaneous reactions, on further trial, will prove to be as valuable as they promise.

YELLOW FEVER IN MEXICO.

EDUARDO LICEAGA,
Mexico City.

Read before the American Public Health Association, Colorado Springs, September, 1913.

The report which I presented to this Association in September of the last year regarding the yellow fever in the Mexican Republic referred to a period ending in August 31, 1912. I shall now give you an account of new cases since September 1.

Besides the cases referred to in my previous report, which were found in San Juan Bautista during September, October and November, six more occurred, occasioning two deaths, after which the epidemic disappeared.

I stated in my report that there had been some cases in Frontera, among the steamship *Walkyrian's* crew, and afterwards we knew of seven new cases during September and October, two deaths having been registered, with no more cases thereafter.

During September two were found in Laguna del Carmen, one aboard the steamship *Puebla* and another one in the town, the epidemic disease having since disappeared.

Five cases occurred in Merida in September and November, the last one on the 20th of the latter month; and afterwards another one on April 8, the patient being a woman by the name of Carolina Acosta. From the investigations made, it appeared that this woman had gone in company of some soldiers from the sixteenth battalion, from Campeche, and on board the railroad which unites both cities. An investigation, therefore, was started in Campeche in order to find out the origin of the disease and, during the course of this investigation, new cases occurred since May 29, which had numbered thirteen altogether, with seven deaths.

The total number, therefore, of cases in the Mexican Republic from September 1, 1912, up to date, have been forty-three with twenty-six deaths.

The data which I present show the places where the disease has presented itself and the number of cases in each place, but I have the satisfaction to state that not a single case has again appeared in the port of Vera Cruz since February 11, 1909, and that the mosquitoes in that port have greatly disappeared. Let us remember that Vera Cruz was the seat of the yellow fever for centuries. Now we may consider that it has been completely banished from there.

In Tampico, another place which has been so much visited by the yellow fever, the last case occurred on November 3, 1903. Therefore, the only small focus of this epidemic disease is found at the port of Campeche.

All of the measures taken against this disease, and which have been in

practice since 1904, are in as full observance today as if the yellow fever would exist yet in the Mexican coast. Therefore, some brigades are working in Tampico, Vera Cruz, Merida and Progreso. In Coatzacoalcos, one of the extremes of the isthmian railroad through which the interoceanic traffic is made, a moving brigade which exercises its vigilance from said port to Santa Lucrecia, a place where the railroad of the Isthmus and the railroad of Cordoba to Santa Lucrecia make the crossing. Another moving brigade has its headquarters in Cordova and has on its charge the vigilance of the whole state of Vera Cruz up to Santa Lucrecia, and a third moving brigade with headquarters in Salina Cruz, a Pacific port where the Isthmus railroad starts to connect the two oceans, acts in this part of the Isthmus up to Santa Lucrecia, this place being, therefore, the junction of the three mentioned brigades.

The campaign in Merida has been made with the greatest energy, trying especially to destroy the mosquitoes. The city is divided in five districts, every one of which is under the care of a physician expert in the campaign against the yellow fever. He has a sufficient number of agents and porters so as to exercise a good vigilance upon all houses in a period of less than twelve days, so as to avoid the development of the mosquitoes in the reservoirs of water which exist in all such houses. The period of their development, from the deposit of the egg up to the time in which they appear with wings, is longer than twelve days, the vigilance being exercised in the places where those eggs may be found every twelve days; that is to say, before the necessary time for the development of the insect, it is quite sure that the larva deposits will completely disappear.

Besides this, oil is put in the house tanks, in the marshes and all deposits of water in connection with the sewer services, and the destruction of the winged mosquitoes is made through all means prescribed by the science; and we have, therefore, to hope that this focus of yellow fever will also completely disappear.

In order to destroy the epidemic which has lately appeared in Campeche, the brigade existing in that port has been supplied with oil and disinfectants, so as to follow exactly the same process now established in Merida.

I beg to call the attention of the Association to the fact that the service against the yellow fever, in all places where it has existed, is in practice only during the summer season, while in Mexico this service is made all the year round and it has been so during the last ten years since we began to fight this disease.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

The July meeting of the Massachusetts Association of Boards of Health was held at Gallop's Island, Boston Harbor, Thursday, July 30, under the presidency of Mr. James C. Coffey, of Worcester.

The Executive Committee reported favorably the following names for admission to membership: John D. Hassett, agent of the Board of Health, Fitchburg, Mass. George W. Day, of Lexington, Mass., inspector of plumbing for the Concord Board of Health. Herbert W. Macomber of the Marshfield (Mass.) Board of Health. A. A. Arthur of the Marshfield (Mass.) Board of Health. W. Herman Kent of the Marshfield (Mass.) Board of Health. Dr. F. L. Lowell of the Health Department of Boston. Dr. Carl C. MacCorison, superintendent state sanatorium, North Wilmington, Mass.

The applicants named were admitted to membership by vote of the association.

THE PRESIDENT: The Executive Committee recommend to the association that at the next quarterly meeting, in October, a part of the meeting be devoted to answering questions, and that those questions be submitted in writing to the secretary at least two weeks before that meeting, in order to give him time to find men who will be ready to answer the questions when they come up. It was thought desirable to start this matter. It is not a new matter in organizations, although new with us. It was thought that a great many of the boards of health in the smaller cities and towns were having questions come up quite frequently, perplexing things, that perhaps other boards of health have met and settled successfully, and that the information thus acquired might be given to those that are in want of it by having the questions submitted to the secretary at least two weeks before the meeting. The Executive Committee recommend to the organization that a portion of the October meeting be devoted to that purpose, to give it at least a trial.

The recommendation of the Executive Committee was adopted.

The following papers were then read: "The Sewage Disposal Problem in Villages and Small Cities," by Prof. George C. Whipple, Harvard University. "Scarlet Fever," by Dr. Edwin H. Place, South Department, Boston City Hospital. (These papers appear elsewhere in this issue.)

The meeting then adjourned.

HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS.

Manchester, N. H.

The report of the Board of Health of Manchester for 1913 may in many respects serve as a model for other towns. Manchester has a population of only 73,000 and spends less than thirty cents per capita on health work, including the maintenance of an isolation and smallpox hospital. The report, however, although covering only thirty pages, presents an excellent summary of the work done by the board along its various lines of activity. Statistical reports are furnished for reference but the greater part of the emphasis is laid on the non-statistical side.

In the general report of the board are mentioned each of the divisions of work with brief comments on any unusual occurrences of the year and on the innovations introduced in the method of carrying on the work. Here are given the recommendations for improvements, which include the construction of a new isolation hospital and the incineration of refuse. Interesting com-

ments on the infant mortality among mill workers, and on medical inspection of schools are also given, apparently in reply to hostile criticism. A copy of a score card which has been put in use for barber shop inspection is printed.

The report of the milk inspector, in addition to statistics, is planned to be of educational value both to consumer and producer. The reports of the plumbing inspector and sanitary inspector follow the same plan to a less extent.

Owing to unfavorable conditions for health as a result of the large foreign population and accompanying unsanitary conditions, the death-rate (17.65) and the infant mortality rate (178) are high but the contagious disease situation is apparently well controlled. Tables are given showing cases of deaths from contagious diseases during the past 29 years and for 1913 by months. Deaths are also classified under the international system by months.

New Bedford, Mass.

The annual report of the Board of Health of New Bedford for 1913 is rather brief and largely confined to tabulations and short statements of routine work. New Bedford is a city of about 105,000 and its health problems are more difficult as a result of having nearly 50,000 foreign born, most of them mill workers. The death-rate for 1913 was 15.93 per thousand population and it is interesting to note that of 1,673 deaths 244 resulted from diarrhea and enteritis under two years (Int. Class. 104), 244 from pneumonia (Int. Class. 91 and 92), and 155 from tuberculosis (Int. Class. 28-35). The birth-rate was 30.8 and the infant mortality rate 159.3.

The financial statement of the board is not given but nearly \$42,000 was expended on contagious disease alone; \$12,000 of this

being used in handling an epidemic of smallpox which broke out during the year, and \$23,000 for the care of tuberculosis. \$2,575.-76 was spent in the treatment of cases of ophthalmia neonatorum.

The city nurse reports making 2,721 calls on tuberculosis cases in and following up reports of births. Medical inspection of schools is carried on and this year a special nurse has been employed for service in the parochial schools with good results. The milk inspector is also inspector of slaughtering and provisions and has only found time to visit the dairies once during the year. He recommends more frequent inspections. No analysis of milk samples is reported. The sanitary inspector apparently acts only on complaint and reports only 553 investigations.

Winnipeg, Manitoba.

The 1913 report of the Department of Public Health of Winnipeg, prepared by Medical Health Officer A. J. Douglas, comes up to its usual standard of excellence. Winnipeg is a rapidly growing city, the population having increased from 166,000 to 184,000 in the past year, and the health department is proportionately progressive. The report is a large one (196 pages), but is so neatly prepared and printed and so well illustrated that it will prove attractive to the ordinary citizen and have a distinct educational value, as well as being of interest to readers who are more interested in methods than in the local work.

The staff of the department includes 54 employees other than ordinary laborers. The summary of the financial statement which has been added to this year's report, using an estimated population of 200,000, shows a total net expenditure of \$1.02 per capita, but of this \$0.68 goes for collection and disposal of refuse. The crude death-rate for 1913 was 11.9, a reduction of 1.5 from the 1912 rate. The birth-rate was 30.2, the same as in 1912 and the infant mortality rate 169.8, a reduction of 29.7 per thousand from the 1912 rate. The crude typhoid death-rate has been reduced from 222.6 per 100,000 population in 1905 to 9.7 in 1913, and the corrected rate is only 4.3. Difficulty has been experienced in getting complete reports of contagious disease and partially as a result of this there has been a serious epidemic of scarlet fever and also rather high death-rates from measles and whooping cough.

The division of sanitary inspection reports nearly 40,000 inspections in the course of the year, covering nuisances, plumbing, smoke, overcrowding, laundries, barber shops, stables and various other lines of work. Recommendations were enforced by reinspection and 721 court cases were brought with 677 convictions, and fines and costs amounting to \$5,876.50 brought into the department. Housing inspection, with especial regard to overcrowding and insufficient plumbing, has been vigorously pushed and there are several illustrations of houses with description of the case below which attract attention to this work.

The report of the dairy and food division is unusually attractive, containing not only an interesting description of methods and accomplishments, but also illustrations of model producing plants, forms used in inspection and licensing, portions of the museum which the division maintains, and plans and specifications for a modern dairy barn. Diagrams also show what portions of the milk supply is tuberculin tested, what portion pasteurized and so on.

Other reports of unusual interest are on legislation enacted and needed, on publicity and education as carried on in the past year, and on the ventilation problem as it is found in cold climates. The statistical report is also of more than passing interest since it is pleasantly compact but still takes up some interesting studies; for instance, stillbirths and infant mortality rates by nationality of the mother.

Youngstown, Ohio.

Not infrequently boards of health fail to publish an annual report, taking the stand that their money may be more productively spent in other directions. When a report is wholly statistical there may be truth in the opinion, and, especially in the smaller cities, it would be sufficient to merely prepare mimeographed reports to be used for records and to be presented to the city officials. The opinion is now gaining ground that, up

to a certain extent, money spent in publicity and education brings in greater returns than when spent in any other branch of public health work, and the tendency is to make the report educational to the ordinary citizen (who does not read the statistics) by describing the work of the department, what it has accomplished and what improvements are necessary.

Youngstown estimates its population at

100,000 but issues a report of only 26 pages and of this only one page, the report of Doctor Welch, the health officer, is actual reading matter; the remainder being tables of statistics. Such a condition may be brought about by the limiting effect of local ordinances or by lack of sufficient money, the latter apparently being the case in Youngstown.

Doctor Welch indicates that the appropriation for health work has not kept up with the growth of the city and as a result

branches of the work do not receive the attention they deserve. Nevertheless, the sanitary officer reports 21,073 premises inspected by the sanitary police, the dairy inspector reports 1,242 inspections and the bacteriologist 4,743 examinations. The death-rate is only 13.4 but, accompanied by a low birth-rate, may indicate an error in estimating population. The statistics indicate that the contagious disease situation is well in hand although the typhoid rate is rather high.

No financial statement is given.

DEPARTMENT NOTES.

For Better Health Service in Connecticut.

On June 9 a state-wide conference on public health was held at Greenwich, Conn., by the School of Politics of the Progressive Club of Greenwich. Health authorities from various states were called in to assist in the opening of a campaign to secure a model state health department for Connecticut in place of the present machine-ridden system of health administration.

The School of Politics has issued a Bulletin on the Public Health System of the State of Connecticut and from this it appears that the authority and responsibility of the Connecticut health system are so divided that only the willingness of officials to coöperate with each other can do any good. The one link connecting the different branches of the health service with each other and with the people they are supposed to serve is the governor of the state. On the one hand there is a State Board of Health appointed by the governor and vested with power to make investigations and publish reports. On the other hand, the actual enforcement of laws in Connecticut townships is done by some 400 town health officers appointed by eight county health officials. These county officers, who must be attorneys-at-law, report annually to the state board, but they are appointed and removed by the Superior Court and paid by the comptroller of the county.

The town health officer, says the law, must be some discreet person learned in medical

and sanitary science. It does not state that he must be a practising or a graduate physician, or a local resident. He is absolutely dependent on the county official who can veto any measure and must approve every prosecution under the law. But the people of the town must pay the bills for this officer. The only voice that local residents have in the health service is expressed in the choice of town clerk who keeps vital statistics, and in the choice of the school committee.

Through the recent health conference the School of Politics expects to create a demand for an efficient state health board or commission and for expert town and county officials who shall be responsible both to a central authority and to the local citizens they serve. A non-partisan state committee on reorganization of the public health laws and a board of publicity and education are about to be appointed.

The Survey, June 27.

New Massachusetts Health Department.

A new State Department of Health has been created to succeed the old Massachusetts State board. The new department consists of a single commissioner as executive officer and a council of health, made up of the commissioner and six other members.

The commissioner, appointed by the governor, has a term of office of five years and an annual salary of \$7,500. His powers are to administer the laws relative to health and sanitation; to appoint and remove, with the

approval of the council, directors of divisions, district health officers and other members of the staff; to fix their compensation; to submit to the council an annual report, and to perform all executive duties formerly required of the State Board of Health. He must give his whole time to his official duties.

The councilmen are appointed by the Governor for three-year terms. At least three must be physicians. Their compensation is \$10 per day while in conference, and traveling expenses. Their duties are to make and promulgate rules and regulations, hold hearings, take evidence in appeals, consider plans and appointments and submit an annual report.

The law calls for eight health districts, with a district officer for each. He shall give his whole time to the work and his compensation shall not exceed \$3,500 per year.

The Engineering Record, August 15.

Vital Statistics in Kansas.

The State Board of Health of Kansas is not content with merely passing the new law for the registration of vital statistics and placing it on the books. Their monthly bulletin for July reports the employment of a special attorney to look after violations of the law and prosecute the violations. Six doctors and two local registrars are mentioned who have been prosecuted and fined, the fines running from five to twenty dollars and costs.

Tuberculosis to be Treated as Communicable.

The Minnesota State Board of Health, at a recent meeting adopted the following resolution in regard to the control of tuberculosis:

"WHEREAS tuberculosis is now recognized as a communicable disease: Therefore be it

Resolved, That a case of open tuberculosis must be isolated either in a sanatorium or at home.

Resolved, That all early cases shall be so cared for as to prevent the disease reaching a stage that will become dangerous to others, if possible."

These regulations, having been promulgated under authority of Minnesota Revised

Laws of 1905, section 2131, have the force of law.

To enforce regulations of this kind it is apparent that the State Board of Health must have some means of knowing of the occurrence of all recognized cases of the disease. This is provided for by a law enacted April 23, 1913, and regulations promulgated November 19, 1913, requiring the reporting of all cases of tuberculosis. (See *Public Health Reports*, July 11, 1913, p. 1465, and Apr. 24, 1914, p. 1045.) The enforcement of these requirements will give the State Department of Health the necessary information in regard to the occurrence of cases and will make it possible to enforce the regulations regarding the isolation of open cases and the proper treatment of early ones.

There has been much talk during the last few years among medical men, and especially among those engaged in public health work, regarding the control of tuberculosis. The action of the Minnesota State Board of Health seems to be one of the most logical and sincere efforts to control the disease made by any health department. The results obtained in Minnesota during the next few years will naturally be watched with much interest by all associated with public health administration.

Public Health Reports, August 7.

New Regulations for Federal Meat Inspection.

The new meat inspection regulations governing the slaughtering of cattle, sheep, swine and goats, and the preparation of meat food products in inspected establishments were signed by the Secretary of Agriculture on July 15, 1914.

All the regulations become effective November 1, 1914, except those governing imported meats, which go into effect January 1, 1915.

The Department of Agriculture is limited by law to jurisdiction over the slaughtering and packing establishments which sell their products in interstate or foreign commerce. These establishments slaughter 60 per cent. of the meat used in the United States. The slaughtering and packing establishments which sell their product wholly within the

state in which the animals are slaughtered are beyond the jurisdiction of the Department.

The more important changes, made as the result of the development of veterinary science and practical experience in meat inspection, are as follows:

DISEASED ANIMALS TO BE CONDEMNED
PRIOR TO SLAUGHTER.

The new regulations provide that inspectors shall make a rigid ante-mortem inspection, and if they find clear evidence in the live animal of the existence of a disease which unfits its meat for food, they shall condemn the animal and prevent its entry for slaughter into the food-preparing departments of the establishment. The animal so condemned must be slaughtered in a separate place and put at once into the denaturing tank to be turned into fertilizer or other nonedible products. This rule is more strict than the ante-mortem inspection prescribed in the old regulations.

In view of the present shortage and high prices of meat, and the fact that every pound of meat that is condemned necessarily adds to the cost of producing meat that is passed, the new regulations provide measures whereby the packers can sterilize and cook thoroughly certain classes of meat and sell it in cans or sealed containers, labeled plainly "Second-class Sterilized."

The regulations governing the sanitary condition of packing establishments, the cleanliness of employees, and the care of utensils and instruments have been redrafted into a series of definite rules. This, it is believed, makes compliance with the rules easier on the part of the packers and makes detection of violations simpler for the inspectors.

These rules are very explicit as to the provision of washing and toilet facilities for the help, as to the condition of clothing, and as to the cleanliness of the hands of those handling the meat. The rules also explicitly prohibit the passing of meat which has been allowed to touch floors or become contaminated by contact with condemned meat or knives used in butchering diseased meat.

The regulations prescribe that any in-

spected establishment which violates any regulation may suffer the penalty of having all inspection withdrawn. This would mean that such establishments could not ship any meat in interstate commerce or abroad. This is designed to strengthen the Department's authority to compel establishments to observe sanitary conditions.

Medical Inspection of New York Schools.

Plans for 1915 are now being prepared by the Bureau of Child Hygiene of the Department of Health of New York City, which has charge of the health supervision of the school children, to extend the scope of its activities and to make its work more efficient. To do so the Bureau will request a budget allowance for 1915 of \$554,670, or \$123,780 more than this year's. The increases asked for are to provide for 9 additional medical inspectors, 3 surgeons, 9 dentists and 84 nurses. The Bureau of Welfare of School Children of the New York Association for Improving the Condition of the Poor is urging this advance upon the city authorities as a necessary expenditure to safeguard the health of the school children.

The Bureau of Child Hygiene is making these requests for additions to its staff after investigations conducted by it and by the Bureau of Welfare of School Children of the New York Association for Improving the Condition of the Poor. The latter bureau, after an intensive study of the clinics where school children are treated for physical defects, came to the conclusion that they met a distinct need and that their services should be extended.

In support of the need for greater activity by the Municipal Bureau, General Director Bailey B. Burritt of the Association for Improving the Condition of the Poor today described this investigation that the Association's Bureau has been making and the problem confronting the Department of Health. Mr. Burritt said: "The greater part of the Bureau of Child Hygiene's work relating to school children is in examining pupils for contagious diseases and physical defects, and in operating a number of clinics for poor school children suffering from the common defects—adenoids, enlarged tonsils,

defective teeth, defective vision, and contagious eye diseases. To gain some insight into the magnitude of the Bureau's operation it is but necessary to state that there are enrolled in the public and parochial elementary schools of the greater city 885,577 pupils. Of this number 330,179, or 37.3 per cent., were given a physical examination at the hands of the school medical inspectors last year. These doctors found that of the number examined 230,432, or 69.7 per cent., had some physical defect requiring treatment. Upon the basis of this survey there are about 617,247 children in our public and parochial schools suffering from one or more of these defects.

Anti-typhoid Inoculation in North Carolina.

With the active assistance of the full-time county health officers, of which there are now eleven in the state, the State Board of Health of North Carolina is carrying on an active campaign against typhoid fever by means of the preventive inoculation. The hygienic laboratory is sending out about 9,000 doses of the bacterin each week but is unable to supply the demand. The health officer of Nash County reports giving 2,582 inoculations in July and the health officer of Johnston County has a record of giving 280 inoculations in 300 minutes. The movement is receiving considerable publicity and as people realize its value and the absence of any harmful results the demand for inoculation steadily increases.

The objection which has at times been voiced, namely, that as immunity is popularized sanitation will be neglected, is answered by the active pushing of sanitary improvements which are necessary for hook worm as well as for typhoid. Also the fact remains that, as a result of the inoculation, many who would have had typhoid during the coming year will now escape.

Laboratory Diagnosis in New York.

The *Weekly Bulletin* of the Department of Health of New York City tells in the issue of August first of the magnitude of the laboratory work carried on there as follows:

"The daily routine work of the diagnosis

laboratory consists of examinations of diphtheria cultures, of specimens of sputum for tubercle bacilli, of Widal examinations for typhoid fever, of blood examinations for malaria, of examinations of spinal fluid for meningitis, and in addition the examination of urine from patients at the department clinics.

"The examination of diphtheria cultures is now very heavy work, averaging at present something over 500 culture examinations per day. This is difficult and responsible work and can only be done by men who have received the proper amount of training and experience in the subject.

"The number of sputum specimens averages about 150 per day. This work is less difficult than diphtheria examinations but at the same time requires care and proper training in the use of the microscope, etc. Three men* are now doing all of the diphtheria examinations, while the sputum examinations are taken care of by about ten men.

"In order to furnish an adequate supply for the use of physicians, the laboratory has to prepare a large number of diagnostic outfits. At the present time something like nine or ten thousand culture tubes are sent out each week, with a corresponding number of swabs and other outfits in proportion. There is much detail in connection with all this work, especially in the matter of ordering all the supplies needed, and in seeing that all of the supply stations are properly equipped, etc."

Temporary Closets During Construction.

The city of Winnipeg has come to the conclusion that in the past a considerable part of its typhoid has been caused by insanitary surface closets built by contractors during the construction of buildings or for the use of men engaged in public works. These closets are necessary to avoid the commission of nuisances in the neighborhood but are nevertheless a potential source of contagion by means of the fly, nearby wells, etc.

To meet the difficulty the health department has issued a circular describing the conditions under which temporary closets

may be erected and maintained. All must be constructed in a workmanlike and substantial manner and be fly-proof and water tight. Earth pits are not allowed and all containers are to be cleaned by the scavenging division of the city at least once a week and oftener if necessary. For this cleaning a charge of one dollar is made. When the basement is complete and sewer connection is made, the closets must be transferred to the basement and connected to the sewer.

The department prosecutes without notice any person who—

1. Erects any building or employs any men on outside works without providing closet accommodation for the men employed;

2. Erects any such closet without first obtaining a permit from the health officer;

3. Fails to construct any such closet according to the specifications given;

4. Does not maintain any such closet in a cleanly condition or who fails to have the same regularly cleaned by this department;

5. Neglects to remove any such closet on completion of the building or when notified to remove same.

6. Buries or otherwise disposes of the contents of any such closet.

This year 700 permits have already been issued, and, notwithstanding the specific instructions given to every applicant for permit regarding the construction and maintenance of such closets, the department has been obliged to prosecute no fewer than 40 cases. The fines range from \$2 and costs to \$20 and costs, the police magistrate taking a serious view of the dangerous possibilities of such conveniences when not properly maintained.

Tuberculosis in Immigrants.

In an interesting paper presented at the recent annual meeting of the American Sanatorium Association, Dr. Walter Rathbun, physician in charge of the Otisville Sanatorium, called attention to the fact that out of 1,197,892 immigrant aliens admitted to this country at Ellis Island during the year ending January 30, 1913, only thirty-eight were debarred on account of tuberculosis. That this small number can rep-

resent but a small fraction of immigrants actually tuberculous will hardly be doubted by anyone familiar with the disease. Nor is the failure to recognize more infected individuals at all surprising in view of the large number of immigrants to be examined and the very inadequate number of examining physicians.

According to Doctor Rathbun, a stricter examination should be made of all immigrants on arriving, and in every instance the chest of these individuals should be examined by physicians skilled in the diagnosis of tuberculosis. Doctor Rathbun suggests that the Federal Government appoint a commission of experts to study the situation and to outline a more thorough system of examination.

N. Y. Medical Journal, August 8.

Coöperation in Health Advertising.

The State Department of Agriculture has invited the State Board of Health and the Department of Education to join with them in fitting up the special train which the railroads of Tennessee are carrying over the various lines within the state. The State Board of Health and the Food and Drugs Department have equipped a "sixty-foot" car with exhibits designed to interest and instruct the public in health matters. It is a matter for congratulation that the railroads and the Department of Agriculture of our state appreciate the need for popular education in behalf of health preservation, and that they stand ready to give such help as is being given in carrying the Health Car to be seen by the many thousands who will visit it.

Journal of The Tennessee State Medical Association, August, 1914.

Vaccinating an Entire City.

Among the Mexicans the principal diseases are tuberculosis, dysentery and other intestinal diseases, measles and particularly, smallpox. During May there were twenty-two cases of smallpox with seven deaths, and during June, twelve cases with four deaths, the last case being reported June 21. No cases whatever have occurred among the American troops. The Health Depart-

ment began general vaccination May 18, with virus obtained from the United States, and up to June 30 had vaccinated 41,404 persons. Fifty per cent. of all vaccinations have been successful, and among children, the primary vaccination has succeeded in between 80 and 90 per cent.

Since the total population is less than 60,000, the vaccination of the entire city will soon be completed and smallpox will be a thing of the past. Already two weeks have passed since the development of the last case.

Journal of the American Medical Association, July 18, 1914.

Crusade Against Flies.

To assist in the crusade against flies and strike at the chief source of flies, the health officer of Montclair, N. J., has sent out the accompanying letter. The plan has been copied in other places, among them the co-operative board of health at Needham, Mass. *To Owners of Stables:*

Your attention is respectfully called to the fact that at least 90 per cent. of all flies breed in horse manure. Each female fly lays about 120 eggs at a time. In 30 hours or less the eggs hatch into larvæ, or "maggots." Often the larvæ cannot be seen until the pile of manure is distributed, as they usually remain below the surface. In a few days the larvæ transform into pupæ from which, a few days later, the full grown flies emerge.

There is no way of screening or covering manure so that flies cannot breed in it. The eggs are often laid in it before it is removed from the stable and the flies that develop from these eggs will fly out whenever the doors to the pit are opened. The only way to prevent the flies from developing in the manure is to treat the manure with some preparation that will kill the larvæ, or maggots. If the manure is removed from the premises once a week the flies will develop elsewhere. There is also the possibility that all of the manure may not be removed each week, as a manure pit is rarely emptied, so that some treatment is necessary.

Our experiments show that if the manure is thoroughly wetted with a solution of 1 part of pyxol to 100 parts of water before it

is placed in the pit, the larvæ will not develop. This solution costs about two cents per horse per day. Other methods of treatment may be equally effective.

You are notified that according to the Sanitary Code of the Town of Montclair you will be liable to a penalty of \$10 if you permit flies to breed upon your property. This ordinance was enacted as a measure of protection to the public health, as it is well known that flies are carriers of disease. This circular letter is sent to you so that you may be fully advised as to how to protect yourself against any unintentional violation of the ordinance. It is the purpose of the Board of Health to prevent flies from breeding in horse manure, and the coöperation of stable owners is earnestly requested.

Any stable owner may easily ascertain for himself whether he is using enough of the solution by making a careful examination of the manure pit from time to time. Frequent inspections of all the stables in the town will be made throughout the fly-breeding season to determine whether the manure is being treated properly, and legal action will be taken against those who permit this nuisance upon their property. *This is a final notice.*

C. H. WELLS,
Health Officer.

Pellagra Statistics in North Carolina.

From a portion of the vital statistics report of North Carolina, we have interesting figures on the increase of deaths in this state from the baffling disease, pellagra. Approximately 972 deaths occurred last year as against 732 deaths of 1912 and 1,074 deaths in 1911. This gives an annual death-rate per 100,000 of 48.2 for 1911, 35.0 for 1912 and 42.2 for 1913, or an average of 41.6 for the last three years. This is nearly twice the average typhoid fever death-rate in the United States, which is 21.0 per 100,000 population.

It is interesting to note that, like typhoid, the pellagra death-rate was high in 1911, lower in 1912 and higher again in 1913. Some may interpret this as bearing out the theory that like typhoid it is a filth disease, perhaps caused by lack of sanitation, sewers or proper closets.

Among the principal towns of the state, as in the case of typhoid, Asheville is found to be leading with the lowest rate of 5.1 while Raleigh heads the list with a rate of 122.0, followed by Charlotte with 91.0 and Durham with 55.4.

Another interesting fact is that pellagra deaths appear to be from two to three or even four times more prevalent among women than men. This, together with the further fact that the disease is more prevalent in summer and fall, might tend to indicate some household insect pest as flies, bedbugs, fleas, etc., as the possible carriers. The disease also seems to be somewhat more prevalent among the white than among the colored people.

• While this is very unfortunate for North Carolina, doubtless the conditions in other southern states would be found equally bad were the facts known. With this terrific death toll on our southern states, it would seem that our laboratories, men of science and commissions investigating the cause of this disease should redouble their efforts to learn the cause and means of prevention.

Press Bulletin of N. C. Board of Health, August 4.

Lodging House Sanitation.

The Department of Health of New York City has recently been conducting a special campaign to improve the sanitary conditions of lodging houses. For this purpose additional inspectors were detailed and inspections made both of day and of night conditions. In the Borough of Manhattan 2,034 inspections were made and 546 violations of the law regarding lodging houses were reported. These included unclean cuspidors, defective wash basins and baths, unclean waterclosets and urinals, unclean bedding, inadequate water supply, common towels and cups, overcrowding, etc. Many of the nuisances were abated by personal effort but others required notices and 144 court summons were issued although all nuisances were abated before the cases were called in court.

Another investigation was carried out to ascertain how often the baths were used by lodgers, what proportion of the lodgers were

cleanly, and how many had the itch, head lice, or bedbug bites. Of 14,223 daily average number of lodgers it was found that an average of 1,035 were dirty, 114 had the itch, 211 had head lice, 132 had bedbug bites while a daily average of 2,097 baths were used.

State Control of Water Supplies and Sewerage Systems.

Health Commissioner Herman M. Biggs of the New York State Department of Health appointed a special commission this spring to investigate certain special problems of water supply and sewage disposal and to advise in regard to the general policy of the department on such problems. The commission consisted of Dr. T. M. Prudden, vice-president of the Rockefeller Institute for Medical Research, chairman; Prof. H. N. Ogden, professor of sanitary engineering in Cornell University; Dr. W. H. Park, director, research laboratories, New York City Health Department; Prof. G. C. Whipple, professor of sanitary engineering in Harvard University and the Massachusetts Institute of Technology; and Prof. C.-E. A. Winslow, professor of biology in the College of the city of New York.

In addition to answering the specific questions the commission made the following general recommendations:

The State Department of Health should have power to require such improvements as it may deem necessary for the protection of the public health in the construction and operation of any system of public water supply.

No new public water supply should be installed and no new source of water drawn from without the approval of the department.

Whenever in any case the requirements as to the operation of a water supply are in its opinion not met, the department should have the power to take over after due notice the operation of the system and continue such operation at the expense of the municipality.

Whenever the sewage-disposal plant of any institution on any watershed draining into a public water supply is operated in

the opinion of the department in such a manner as to constitute a nuisance or a menace to public health, the department should have the power to take over the operation of such plant and to continue such operation as long as it may deem necessary for the protection of the public health, or until the abatement of the nuisance, the expense of such operation to be borne by the institution.

For the proper control of the water purification plants in the state, regular laboratory analyses of the treated water should be made by the municipality or water company owning the same, the results of which analyses should be promptly transmitted, together with all essential operating data, to the State Department of Health.

It should be the policy of the State Department of Health to make regular routine sanitary inspections and laboratory analyses of all public water supplies within the state.

Progressive Health Legislation in New York.

The following new ordinances or amendments of old ones recently adopted by the Board of Health of New York City are interesting as showing the progressive and comprehensive tendency of modern health legislation:

MUZZLING DOGS.

Hereafter no unmuzzled dogs shall be permitted, at any time, to be on any public highway or in any public park or place in the City of New York.

This ordinance was adopted in view of the alarming prevalence of rabies in this city. It is believed that strict enforcement of the muzzling law will make rabies as rare in this country as it is in England.

WOOD ALCOHOL OR WOOD NAPHTHA.

Hereafter no wood alcohol (methyl alcohol) may be introduced into any article of food or drink or into any medicinal or toilet preparation intended for human use internally or externally. When wood alcohol is sold for burning purposes it must be conspicuously marked with a poison label bearing a skull and crossbones, together with a warning

against the human use of the preparation either externally or internally.

OPIUM, MORPHINE, COCAINE, ETC.

Hereafter no cocaine, salt of cocaine, opium, morphine, and no cannabis indica may be sold without the written prescription of a duly licensed physician, veterinarian or dentist.

Objection was made to this ordinance on the ground that it prohibited the sale of paregoric, Warburg's tincture and similar household remedies. The Department of Health, however, feels strongly that the home use of mixtures containing habit-forming drugs is distinctly pernicious and that narcotics of any kind should only be used under the direction of a physician.

SPRING AND MINERAL WATERS.

Hereafter all manufacturers and importers of artificial or natural spring waters must file with the department of health information concerning the source of the water together with a statement giving the results of chemical and bacteriological examination thereto. Carbonated, mineral or table waters, may not be manufactured in this city without a permit from the board of health.

Philadelphia's Second Annual Clean-up Week.

In conducting Philadelphia's Second Annual Clean-Up Week, April 20 to 25, this year, a committee of three men, representing the Bureau of Highways, the Bureau of Fire and the Bureau of Health, was appointed by the Mayor to take charge of the work done under the supervision of the city officers.

The members of this committee were: Mr. John Neeson, Assistant Engineer of Bridges and Sewers, Bureau of Highways, (Chairman); Mr. Joseph Mallory, Fire Marshal, Bureau of Fire; and Mr. R. Robinson Barrett, Chief Inspector of Nuisances, Bureau of Health.

Shortly after the appointment of this committee, the Chamber of Commerce and the Merchants' and Manufacturers' Association of Philadelphia appointed a large representative committee of citizens, to coöperate with the city committee in order to conduct a successful campaign. This committee was

divided into twelve sub-committees, to wit: Finance, press, poster and printed matter, trade associations, community associations, charitable and benevolent, school and school children, churches, retail stores, street cars, vacant lots, fire prevention.

Persons on this citizens' committee were all prominent business men and men interested in civic activity in Philadelphia.

In order that every citizen might know the date and the object of clean-up week, and in order that they might give their best co-operation, a very extensive and most effective advertising campaign was entered into. Naturally the publicity work was of first importance and the methods used may well serve as a model for the means of applying up-to-date advertising methods to sanitary work.

The Director of the Department of Public Works sent out 3,400 personal communications to the following:

- (a) All advertisers and advertising agencies, manufacturers of brushes, brooms, buckets, vacuum cleaners, and, in fact to every concern manufacturing any kind of an article used for cleaning.
- (b) All women's civic organizations—civic club, home and school league, literary, etc.
- (c) All business men's organizations.
- (d) All theater managers.
- (e) Managers of moving picture houses.
- (f) All real estate agents.
- (g) All banks and trust companies.
- (h) Boards of trade.

Large display placards bearing a silhouette of William Penn, broom in hand, were placed in the windows of all street cars and distributed to schools, libraries, clubs, and commercial and industrial establishments with the request that they be posted. 750,000 gummed labels were sent out to stores, newspapers, etc., to be attached to letters and packages. 260,000 four-page bulletins were

distributed by the police to each home, the bulletin being handed to the householder instead of being merely thrown on the porch. Colored display cards were posted in the windows of all stores and larger copies of the same placard were used on billboards. Badges and blotters with information about clean-up week were distributed in all schools. Circulars were enclosed in letters by department stores, insurance companies, lodges, etc. Colored slides were shown at the moving picture theaters and many other means of advertising were used in addition to an extensive newspaper campaign.

Although the collection of refuse was carried on the regular days of ash and waste collection, hundreds of extra teams were employed. All municipal buildings were cleaned up and offices and desks were cleaned out at the same time. Fire plugs were painted by the city and the gas company painted their lamp posts. Where owners refused to coöperate in cleaning up vacant lots mandatory orders were issued by the bureau of health and where these orders were not complied with the bureau did the work and the property was liened.

So great was the response of the people that it was found necessary to continue the campaign for a second week. It is estimated that 135,000 cubic yards of waste material were collected.

"Disease Prevention Day."

The Governor of Indiana has consented to issue a proclamation calling the people of the state to observe a day in October, to be designated as Disease Prevention Day. Sixty anti-tuberculosis societies will lead in observing the day, and will have the co-operation of the State Board of Health, the State Anti-Tuberculosis Society and municipal officers of many cities.

Public Health Nurse Quarterly, July.

PUBLIC HEALTH NOTES.

Dilution and Sewage Treatment.

The *Engineering Record* (August 15) gives a brief statement of the conclusions of the International Joint Commission which, during the past few years, has been at work investigating the pollution of the Great Lakes with a view to bringing about an understanding on such matters between the United States and Canada. The report has especially to do with the relative advisability of purifying water or sewage and the use of dilution as a means of sewage disposal without other treatment. We quote the resumé of conclusions as given in the *Record*:

1. In general, all surface water to be used for public supply should be purified.

2. A step is taken toward the establishment of a policy intended to prevent the discharge into boundary waters of any sewage without at least a simple treatment, such as sedimentation or screening.

3. The adequate dilution of a sewage is a highly satisfactory means of disposal, and utilizes an important and economical natural resource.

4. The settling of the suspended matters by gravity in suitably designed tanks, or even the efficient screening of the sewage, is recognized as an important fundamental treatment.

5. The propriety of considering reasonable economy in the working out of such problems as these is established.

While the deliberations of the commission refer specifically to matters connected with the pollution of international boundary waters, the statements of the board of engineers may in a large way be applied to all bodies of water where sanitary questions are involved. The statements commend themselves to all who have to deal with questions of public health and public cleanliness.

The Navy Screened in Mexican Waters.

"The screen is the thing. All the American vessels in Mexican waters are screened

against mosquitoes. As a result, according to a report from Rear Admiral Badger, commander-in-chief of the American fleet, the number of cases of malaria on board has been negligible as compared with the prevalence of the disease ashore. Early in May, Admiral Badger reported that it became necessary to remove the screens on the *Des Moines* when that ship was stripped for action. The *Des Moines* was stationed in the Panuco River at Tampico, and although the screens were removed only for a brief period, seventy cases of malaria developed on the ship. The moral is: Screen against mosquitoes and save the family from malarial attacks. And, of course, it is even more important to screen against flies."

The Health Bulletin, N. C. Board of Health, July.

Abolishing Private Hospitals.

The *Canal Record* of July 22 tells of an interesting measure recently taken by the chief health officer of the Canal Zone to aid in the control of disease. We quote his order below:

"By virtue of the authority vested in me by Presidential Decree No. 23 of July 19, 1904, I hereby establish the following health regulation for the cities of Panama and Colon:

"Whereas, the maintenance of private hospitals in the cities of Panama and Colon will seriously interfere with the supervision and control of this department over sanitary matters in said cities,

"Therefore, be it ordered that no private hospitals shall be established or maintained in the cities of Panama or Colon, and any such hospital now being conducted in either of said cities shall be discontinued upon the promulgation of this order. Any person who, as a physician, owner, manager, or person in charge of any private hospital in the city of Panama or the city of Colon, shall establish or maintain any such hospital after the promulgation of this order, shall be fined in a sum not exceeding \$500 for each and every day such hospital shall be so maintained, such fine to be enforced in the manner pro-

vided for the imposition and collection of fines for violations of the *Sanitary Rules and Regulations* for the cities of Panama and Colon."

The benefits of the regulation in making complete and authentic knowledge of the extent of disease possible and in suppressing the quacks are obvious.

New Orleans' Plague Policy.

"The prompt action of the authorities in New Orleans is in gratifying contrast to the inactivity, delay and evasion of the responsible officials in San Francisco under similar circumstances ten years ago. There has been no hesitation, no attempt to suppress the facts, no indignation over the announcement that the health of the city was in danger. New Orleans has learned by years of bitter experience with yellow fever that temporizing and denial always gives disease more time to develop. The local health officers promptly recognized the disease. The state health authorities were immediately notified and took action at once. Before the facts had had time to appear in the daily press, the United States Public Health Service had been called on for assistance. Surgeon General Blue and Surgeon Creel are now in charge of the situation. Wide experience in fighting this disease in Honolulu and San Francisco had given Surgeon General Blue a training for this task possessed by few, if any, other sanitarians, while Surgeon Creel's masterly work in Porto Rico, in controlling the plague on that island is well known. Swift, decisive and effective action is necessary on the part of local, state and national health officers. The immediate coöperation of the general public, and especially of all railroad, transportation and local officials is also necessary. Ports reached by shipping must be watched to prevent landing of the rodents responsible for spreading the disease."

Pan American Surg. and Med. Jour. (New Orleans), July, 1914.

Vaccination in Shanghai.

The *Journal of State Medicine* for July contains a brief review of the annual report of the Municipal Council of Shanghai,

especially in regard to its public health activities. Among other points it comments on the smallpox problem. Although a form of vaccination has been known to the Chinese for two hundred years or more, it is not generally in use and the disease is common. The review says:

"Some considerable increase in the incidence of deaths from smallpox is recorded; there were 17 amongst the foreign and 207 amongst the native community. It is noted that the benefits of vaccination are now being more fully recognized by the Chinese; and it should be remembered that this people practised inoculation against severe smallpox long before the days of Jenner. Vaccination is performed free of charge for all Chinese and indigent foreigners, and there were no fewer than 13,029 vaccinations done during 1913. A most remarkable record!

"A spring campaign (1914) of free vaccination was begun on April 6 which resulted in 2,855 vaccinations being done by the end of the month. It seems probable, considering the greater proportion of cases of smallpox among foreigners, that the Chinese community are now the better protected, so that it may become necessary to provide further facilities for the vaccination of indigent foreigners and of those who are accustomed to neglect this obvious precaution."

The article continues:

"Brief reference must be made to the work of the Public Health Laboratory. It is obvious that for an adequate system of preventive measures such a laboratory must be fully equipped with the most up-to-date resources; and it may be said at once that no pains have been spared to that end in Shanghai. During the year, 21,430 pathological specimens were examined, and it is interesting to note that 63 of these were submitted to the Wassermann test; 511 samples of milk were analyzed, and it says much for the purity of the supply that only 45 were returned as adulterated, 40 of these being water adulteration.

"In 1899 a Pasteur Institute was opened, and since that date 393 persons have received treatment. The virus of rabies in Shanghai dogs is exceptionally intense, and very

strict precautions are always in force as regards muzzling."

Public Health in Time of War.

The *Medical Officer* in its issue of August 8 comments on the outbreak of war and the part which the Royal Army Medical Corps and the Sanitary Service of the Territorial Force will play in the preservation of the health of the army. Turning to the question of public health at home it continues:

"Apart from their military duties, the responsibilities of the public health service must be immensely increased throughout the duration of war. All ordinary precautions to safeguard the health of the community must be redoubled, and it will be the medical officer of health who will note the first signs of privation if, and when, food prices rise or employment fails. We believe that every medical officer of health will regard himself as responsible for something more than the mere routine of his department during this time of supreme trial, and that he will keep his local authority advised of every possible measure which can contribute to the safety and comfort of the community he serves. As a first step we would suggest the immediate issue of leaflets regarding food values, advising housewives how they can spend their money to the best advantage and thus obtain the maximum of nutrition at a minimum of cost. Above all, medical officers of health might with advantage issue a warning to the public against wasteful expenditure on alcohol. Such a warning, without being alarmist, should point out that no one can tell how long the war may last, or how much unemployment may result during the coming winter, so that, alike on grounds of patriotism, self-respect and self-interest, citizens should deny themselves everything which, according to their means, could be regarded as an unnecessary luxury. In this connection we hope the public will avoid the treating of soldiers and sailors to alcohol, so common during the South African War. At the present time all convivial drinking should be regarded as indecent and an offence against society. For although no sane person would wish to create a feeling

of panic, it is necessary that all classes, rich and poor, should realize at once that we are now face to face with an unprecedented crisis, and that it behooves every one of us to consider in all our actions the safety and well-being of the whole community."

A German Model in Milk Production.

The following account from the *Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege* is of a model cowshed and dairy situated in Glinde (Reinbek) and of the measures there enforced to obtain pure milk. It is doubtful whether better results would be obtained than are obtainable in our own model dairies and the expense of installation and probably that of maintenance would be greater.

"The stalls in this cowshed are high and spacious, well-lit and thoroughly ventilated. The walls for some four feet from the ground are tiled, the tiling being scrubbed daily. The whitewash with which the walls above this level are coated is renewed once a month. Spiders' webs and dust are removed from the walls daily. The cattle are stalled in the Dutch style, making it difficult for them to soil their straw bedding. Dung is removed twice daily, and the cows themselves are groomed twice during the day, the hair being kept clipped short by an electric apparatus. The milkers wash their hands and face and the cow's udder before milking, and don clean apron and cap. The first portion of milk is rejected. The milk is at once removed from the cowshed, cooled to 2° C. and bottled.

"As a routine test for the onset of mastitis the rosolic acid-alcohol test is used. It is found that this test determines the onset of mastitis with greater delicacy and at an earlier stage than does the best veterinary skill. The process is as follows:—5 c.c. of milk from each quarter of the udder are mixed with 5.5 c.c. of a mixture of rosolic acid and alcohol. When the udder is healthy, the result of this mixture is to give a yellow-orange tint. When the milk contains cocci or leucocytes a red color is obtained. It is suggested that this and the centrifuge test for cocci and leucocytes should be used as a routine practice in dairies; also that, as

in the above dairy, the daily milk production of each cow should be charted, so that the milkers can recognize at once the onset of diminished milk secretion.

"The milk obtained as above is of very pure quality, such that, cooled, to 2° C. and bottled in stoppered bottles, it can be kept seventeen days unchanged. The cost, though naturally greater than that of ordinary milk, is nevertheless by no means excessive."

Public Health Work in Jerusalem.

More than a year ago, under German initiative, an international health office was established in Jerusalem under the direction of Mühlens, the scientific assistant in the Hamburg Institute for Marine and Tropical Diseases. According to a recently published article of Nocht, director of the Institute for Marine and Tropical Diseases, the support of the institute at Jerusalem at present is shared in common by the German Committee for the Campaign against Malaria in Jerusalem; by Nathan Strauss of New York, and by the Society of Jewish Physicians and Scientists for Sanitary Interests in Palestine. The German committee supports the general department for combating malaria, and its chairman is at the same time the director of the institute. Nathan Strauss supports the hygienic and bacteriologic department of which the heads are Doctors Brunn and Goldberg. The Society of Jewish Physicians and Scientists has taken over the department for protection against rabies, originated by the German committee, the director of which is Doctor Behan. An accessory department for the prevention of eye diseases (director, Doctor Feigenbaum) has been added.

The most important task of the office is the malaria campaign which must be prosecuted in three directions. It is necessary, first, to eradicate the parasites in man by the thorough treatment of patients and also of the apparently healthy germ-carriers.

Even in the dry season, Jerusalem is a city much infested with mosquitoes, especially with anopheles, the malaria carrier. Their destruction is the second task in the campaign against malaria. In Jerusalem, mosquitoes, in addition to the dark dwellings

of the inhabitants, infest the numerous cisterns which are of large extent, very old, defectively built and easily accessible to the mosquito. Jerusalem is still exclusively supplied with rain-water for drinking purposes. The cisterns are also the breeding-places of the anopheles mosquito, and many swarm with mosquito larvæ. If the cisterns were screened against mosquitoes, the mosquito plague, under present conditions, would cease in Jerusalem.

By closing the cisterns to mosquitoes and doing away with the present unhygienic method of drawing water by pails which are let down through larger or smaller openings, generally left uncovered, and by replacing the pails by pumps in well-covered cisterns, it has been possible already to diminish the mosquito plague to a remarkable extent in many parts of Jerusalem.

Here the third form of the malaria campaign must begin by the education of the population, awakening their interest and winning their active coöperation in the removal of nuisances, and by permanent inspection of the cisterns by a health commission (mosquito commission). The authorities of the city have, moreover, made a permanent annual contribution to the work of the health office.

The campaign against tuberculosis has proved to be much more difficult and less promising; it will also require much larger means. Particularly the improvement of the incredibly wretched dwellings of the native population, Jews as well as Mohammedans, will require the efforts of many years and the expenditure of considerable funds. Moreover, carrying out a long period of curative treatment such as is necessary in tuberculosis will be found to be very difficult.

The campaign against other infectious diseases in Jerusalem will depend chiefly on the introduction and progress of a general communal health movement, of which hitherto there have been only very small beginnings. According to the latest newspaper reports, the supply of the city with good spring water by a system of water-pipes has now been undertaken by a French company. The accomplishment of this plan

would render the suppression of typhoid, dysentery and other infectious diseases much easier, especially among the poorer population, who depend on the old cisterns often contaminated with water from the streets.

Jour. American Medical Association, August 15.

The Flight of the House Fly.

At a meeting of the Cambridge Philosophical Society, Dr. E. Hindle described some experiments which he made with G. Merriman in order to determine the housefly's range of flight. During the course of the experiment about 25,000 flies were released under various conditions of weather and temperature. No less than fifty observing stations were arranged where the flies were caught in traps or on fly paper. In order to identify them they had been dusted with red or yellow chalk powder. The experiments showed that the flies winged their way either directly against the wind or obliquely to it. This phenomenon has also been observed in the case of other insects as well as of birds. The greatest distance covered by a fly was 700 meters, and a large part of this lay over open ground. In densely crowded cities, Dr. Hindle does not believe that the fly travels more than 400 meters. In order to secure the widest distribution, fine weather and warmth are necessary. Flies which were released in the afternoon, were not so widely distributed as flies which were released in the morning.

Scientific American.

What is Safe Drinking Water?

In the *Public Health Reports* for June 26, 1914, Dr. Allan J. McLaughlin discusses the qualities of drinking water in a paper which was submitted for the information of the International Joint Commission, which met in New York, May 26 last:

"In order to say that a drinking water is hygienically safe," remarks Doctor McLaughlin, "one must be assured that it contains no pathogenic bacteria. The efficiency of water purification plants varies from day to day and from hour to hour, and an opinion upon the absolute safety of a given water supply cannot be rendered unless many bacteriolog-

ical analyses, made at short intervals during each twenty-four hours, show an absence of *Bacillus coli*. While an absolute dictum is thus most difficult to secure, it is not difficult to determine, by daily bacteriological analyses, that a water does or does not give a reasonable index of safety. Instead of attempting to find the germs of typhoid fever, Asiatic cholera, and dysentery in water, we accept the presence of *Bacillus coli* as an index of pollution with sewage, for the reason that the chances of finding the bacillus are very much better than the chances of finding the other specific germs in the small quantity of water examined.

"When we consider the grossly polluted water supplies used by many of our large cities until recent years, we must admit that even if the present effluents from filter plants do not show constant absence of *Bacillus coli*, they must be classed as reasonably safe, or relatively safe water."

New York Medical Journal, July 18, 1914.

Tuberculosis Administration in Denmark.

It is often illuminating and instructive to compare methods used in the control of communicable disease by European countries with those of our own nation. The following clipping taken from the *Medical Officer* for July 25, outlines the scope of the work carried on in Denmark against tuberculosis.

"A very definite campaign against tuberculosis was started in Denmark in the early years of the present century, about the same time as that which was begun in this country, although previously Denmark had remained behindhand compared with many other European countries. It is true that as long ago as 1874 a hospital for tuberculous patients was founded. It had accommodation for 100 patients, and this was later increased. In 1901 the National League to Combat Tuberculosis was founded. The aims of the League were the establishment of popular sanatoria for the poor, public lectures to enlighten persons as to the nature of tuberculosis, and the giving of relief to the families of patients. As a result of a strong popular feeling brought about through the activities of the League, several laws were enacted in 1905, and again in 1912. One of these pre-

scribes the measures to be taken against tuberculosis, and for granting state subvention for the establishment of hospitals and necessary homes, and for the treatment and nursing at these institutions. It is now the duty of medical practitioners to notify the district medical officer of every case of tuberculosis of the lungs or of the larynx coming under the treatment of the former, and also every case of death from tuberculosis. Free disinfection is carried out of all dwellings occupied by consumptive patients. Tuberculous women are not allowed to act in the capacity of wet nurses, and tuberculous families must not take children to board, nor must tuberculous children be placed out to board in private families. Tuberculous children are not allowed to attend school with healthy children, but suitable instruction must be provided at the public expense. No one must be appointed teacher at a public school, a clergyman in the established church, a keeper or nurse at a public insane asylum, or a midwife paid from public funds, unless a medical certificate is produced that he or she is not suffering from an infectious form of tuberculosis. Like regulations may be issued for other classes of officials whose duties bring them into close touch with many people. If a teacher or other official is dismissed from his appointment on account of tuberculosis he receives a pension of two-thirds of his salary, but he may be required to accept an appointment similar to the one he retired from if he recovers. Soldiers serving out their compulsory time of enlistment who are consumptive are placed in an institution for the tuberculous at the public expense. If a consumptive patient is living under conditions which evidently threaten others with infection, measures can be taken to improve those conditions, and even compulsory admittance to a hospital can be enforced. Unless the patient is able to meet the expenses entailed they are defrayed, as regards three-fourths out of the State funds, and one-fourth out of local funds. The State also contributes about one-half of the cost of sanatoria, tuberculosis hospitals, nursing homes, and seaside hospitals for consumptive persons. The result has been, according to the interesting paper on the subject read by Dr.

Anders Johansen before the Washington International Congress on Hygiene, that there is now ample room in Denmark for tuberculous patients at the sanatoria and hospitals which have been erected throughout the country."

Practical Sanitation in Indiana.

During the last two years, 393 new schoolhouses have been built in Indiana at a total cost of about \$4,000,000. These new buildings are all thoroughly modern and sanitary in their construction and equipment and are in full accordance with the sanitary schoolhouse law of the state. This law, passed several years ago, requires that the plans and specifications for all schoolhouses must be submitted and approved by the state board of health before the contracts for their construction are authorized. The condemnation by the state board of health of numerous insanitary, dilapidated and otherwise unsatisfactory school buildings and the enforcement of the new law have brought about a marked change in school sanitary conditions in Indiana. The results show the ease with which better conditions may be secured, provided effective remedies are adopted. It is obviously much easier to change the plans than to change the buildings, and far better to criticize a building before it is built than after it is constructed. Most persons want to do what is right and will do so if they know what is right at the right time. Indiana's schoolhouse law is a striking example of a sensible law that really accomplishes something. It ought not to be difficult to secure similar laws in every state. In most of our principal cities the plans of every building must be approved by the proper authority—usually the city health board—before the building can be erected; certainly no building is more important than the school.

Journal of the American Medical Association, August 8.

A Health Hint.

Some sarcastic writers for the press are suggesting that after the Army Medical Corps has completed the sanitation of Vera Cruz and other tropical cities it might give its

attention to some of the American cities which sadly need it.

The equally sarcastic reply to this suggestion has been that what was accomplished in Cuba, Porto Rico, the Philippines and Panama, and is now being accomplished in Mexico, was only possible by the use of despotic power; and if the same power were used in any of our American cities it would encroach upon the vested rights of landlords, food and milk purveyors, garbage disposal companies, and many others; and that it would "ruthlessly crush the personal liberty of antivaccinationists, anti-vivisectionists, Christian Scientists, and the followers of Mr. Parry."

Without question we forfeit something to our ideas of personal liberty. If some day we should have a revolution in this country which in the course of suppression should develop another Secretary Stanton, it might be bad for our personal liberty but good for our health.

Editorial, *Xenia Daily Republican*.

Boston's Women's Municipal League.

Among the best official aids in health work are the women's clubs when their activities are directed into the proper channels. The nature of the work appeals to them since it touches so directly upon the welfare of the home and since by training or popular opinion neatness and decency have come to be rather in the domain of woman than in that of man. Since the care of the sick, the welfare of the child, and the purchase of food are a part of woman's work it is natural and desirable that she should take an interest in sanitary affairs. With a little skilled direction the energies of women's clubs may be turned to the accomplishment of much work which will be handled better by them than by the board of health.

Among the most active of such organizations is the Women's Municipal League of Boston. The object of this league is to educate and organize among the women of Boston and the surrounding communities an intelligent, representative, public opinion which will exert its influence in the public service. The League maintains departments of Education, of Food Sanitation and Distri-

bution, of Housing, of Public Health, and of Streets and Alleys. Each department has committees and subcommittees which have care of special divisions of the work of the department.

An educational bulletin is regularly published and is handled by one department after another. The May issue of the *Bulletin* is prepared by the Committee on Rats and Flies of the Department of Food Sanitation and Distribution, and is in many ways a model bulletin of information. It is a thirty-two page publication but is very attractive and readable. The first article is by Dr. Hewitt, dominion entomologist of Ottawa, on House Fly Suppression, and the second by Professor Melander, entomologist of the Washington State Agricultural Experiment Station on The Treatment of Manure. Both articles are concise and so planned that the facts stand out in an impressive manner. The second section of the bulletin is composed of specimens of bulletins and posters for popular education with a list of prices at which they may be obtained from the League. It is altogether an instructive and valuable publication.

Licensing Operators of Water and Sewage Treatment Plants.

In its issue of July 11, the *Engineering Record* comments editorially on a suggestion made by Francis E. Daniels, director of the water and sewerage division of the State Board of Health of New Jersey in his recently published annual report for the fiscal year ending October 30, 1913; namely, that a license be required of attendants at sewage treatment plants in the state. The *Record* points out that it is common to license the engineer of a steam boiler plant, who, at most, may only endanger the lives of a few by his carelessness but that to supervise the operation of sewage treatment plants, any laborer is considered fit without training or experience. Certainly a blunder on his part may cause infinitely more danger than a mistake by a plumber, and plumbers are universally required to pass an examination and obtain a license.

The article goes on to say:

"The need of intelligent attendants is par-

ticularly necessary in plants fitted with complicated dosing or alternating devices. Such arrangements, at best, require the attention of a careful and capable man, and much of the trouble in the field is due either to the improper construction of the dosing device or to the fact that the attendant fails to understand or comprehend the mechanical contrivances and their operation. Too much reliance should not be placed on these automatic alternating and dosing devices, for they get out of order, and when out of order usually require the attention of someone thoroughly familiar with their construction and operation.

"Here, again, is an opportunity for engineers and engineering societies to do valuable educational work. There has been too much lamenting about the disgraceful inefficiency in the operation of filters and sewage treatment plants and too little constructive work to improve it. It is time for technically trained men, who realize the dangers of the present lax methods, to secure legislation which will take out of the hands of the unskilled workman or the political appointee the control of sanitary works upon which the health of an entire community depends and which should be supervised by a skilled chemist or sanitary engineer. It is also time for city councils to loosen the municipal purse strings to the extent of providing an adequate salary for a competent operator or, if the town be a small one, to arrange with other communities for a central laboratory and joint supervision of their filters or sewage plants by properly qualified men."

Teaching Practical Civics as an Aid to Sanitation.

The *American City* of July, 1914, prints an interesting article, entitled Practical Citizenship Taught to High School Boys, which describes an innovation undertaken in a Pennsylvania city. The writer points out that in view of the fact that the usual high school course in civics is given in the fourth year when many of the students who entered with the class have dropped out and since such a course is commonly technical rather than practical it seemed desirable to give a short course in practical citizenship

to the first-year students. In organizing the work the following propositions were kept in mind:

1. The ordinary citizen, immersed in the task of caring for his business and providing for his family, gives at present little thought to civic problems. Good water, sewage disposal, parks, playgrounds, treatment of vacant lots, paving, street cleaning, economy of administration, the City Beautiful, and all other civic problems, are *somebody else's business*.

2. For this reason, principally, the government of American cities has many defects; officials are chosen not for their fitness, but for their political availability; good officials rarely receive credit for what they do, and bad ones are rarely censured.

3. Boys at the age of thirteen or fourteen are full of energy which is usually bent on mischief. Their minds are at that age "wax to receive and marble to retain." Enthusiasms then aroused are more liable to make a permanent impression than at any other age. So, if they can be made conscious of their peculiar responsibility as American citizens, if their pride as citizens can be aroused, the results are likely to be permanent, and thus in the course of years there will gradually be built up a body of citizens that will be a tremendous civic asset to their city.

In classwork was taken up the six fundamental desires of men with which government concerns itself; namely, health, wealth, knowledge, righteousness, companionship, and beauty, and the method of satisfying these desires. Field work consists first of familiarizing the students with what the city has already done and is doing, including visits to the water supply and sewage disposal works, the electric light plant, the park system, etc. The second step consists of a study of defects and methods of improvement. A suggestive program includes:

An ill-paved street.

A billboard.

Faults in garbage collection.

Children in the street.

Defacement of the mountains and of the river front.

A smoking stack.

A dirty alley.

Disreputable vacant lot.

Grade crossing blockade.

Each boy then turns in a series of observations on these various topics to the section secretary, of which there are several. The secretaries then classify these observations and prepare letters to be forwarded to the proper authorities. They have already become personally acquainted with many of these officials by being sent to the city hall, the court house, and elsewhere, in preparing special topics for the classroom work.

The work was entered into enthusiastically by the boys and some excellent reports were submitted, many of them illustrated by original photographs. In the opinion of Mr. S. H. Zeigler, the author of the article, the boys acquired a civic sense which would be permanent.

Health Conservation at the Panama-Pacific Exposition.

The Editorial Bureau of the Panama-Pacific Exposition furnishes the following information in regard to the part which sanitary science and public health will play in this great fair:

Health—physical, moral and mental health—is the topic which in greater or less degree will dominate acres of exhibits not only in the five-acre palace of Social Economy and Education, but throughout the exposition generally. In the great building devoted to social economy will be most of the exhibits made by the various foreign and state governments. These will be chiefly working displays and automatic wax and blown glass models, designed to popularize hygiene, physiology sanitation, factory regulation and the like. These models, for the United States government and for some of the largest business and philanthropic corporations in the country, will be created on an elaborate scale, never before attempted, by the celebrated Dr. Philip Rauer, and a corps of trained specialists who in April of this year came over from Stuttgart, Germany, at the invitation of the Rockefeller Foundation and of the Panama-Pacific Exposition to take charge of such work. Rauer is the man who created the greatest series of models

ever seen, called "Der Mensch" (The Human Being) for the Dresden Exposition, and which it is intended shall be shown at San Francisco. He will install a still greater lot of models for the United States health exhibit, on which a considerable part of the \$500,000 appropriation will be expended. This governmental exhibit probably will be shown in a special federal building to be erected by Uncle Sam at an additional cost of half a million dollars, the President having made such recommendation in April of this year. In the national display the cause and prevention of each of the more prevalent diseases will be visualized by means of models, relief maps and stereomograph pictures in combination with the phonograph and moving pictures.

The hygienic displays made by individual states will be so selected as to avoid duplication. Thirty-eight states and territories will participate. Dr. Rupert Blue, Surgeon-General of the United States' Bureau of Public Health, held a conference in Washington, in June, with the members of all the state boards of health and with the principal municipal boards. At this conference details as to the character and scope of the hygienic exhibit of each state and city was threshed out, so that each will display its specialty, no two showing the same thing at the exposition. This insures an invaluable and varied series of exhibits of an educational nature. It is claimed that this is the first time in the history of expositions that the "no duplication" system has been adopted. It is not confined to any one department, but it is the watchword in all the great palaces of exhibits.

This greatest of world expositions commemorates the completion of the Panama canal, and this, the greatest engineering feat of modern times, was made possible only by the achievements of medical science; the foundation of the whole project being the sanitation of the canal zone. This great work will be exploited with great thoroughness in various exhibits and by learned and scientific bodies. Col. G. W. Goethals will preside over the sessions of the International Engineering Congress which will meet at the exposition for a week in September, and he

and his canal chiefs will make personal reports and addresses on every phase of the canal work, which afterwards will be published in eleven large volumes. About 25,000 civil, electrical, mechanical, sanitary and military engineers from over thirty nations have accepted the invitation to attend this congress. Among the laboratory exhibits will be replica of the Panama canal, 500 feet in length, with miniature ships passing through it, and relief maps, charts, and wax models.

Cuba, which claims credit for doing the pioneer work in tropic city sanitation and in the eradication of yellow fever and plague, which made the later canal work possible, will come to the exposition with an elaborate hygienic exhibit which will occupy the most prominent place in the Palace of Social Economy, and will include model hospital equipment, a model of a fever mosquito as large as an ostrich and automatic models made by Rauer to show at a glance how to combat tropic diseases. Cuba's appropriation is a quarter of a million dollars. Argentina, with the enormous appropriation of three million pesos, will have a very modern welfare and health exhibit, and Japan, France, Germany, the Philippines and thirty other countries will be well represented. It had been planned to bring to San Francisco the most important of the great welfare, civic and health exhibits from the Urban Exposition which opened in Lyons, France, in May, 1914. Also the great British exhibits which were shown at Ghent last year, it is expected will be brought over in their entirety.

In addition to the governmental and state exhibits, there will be unexampled health and human welfare displays assembled by such organizations as the American Steel Corporation, which expects to expend \$100,000 on its exhibits; the General Electric Company, which also will show its appliances for conserving the health of factory employees; the various insurance companies, the Rockefeller Foundation which will concentrate on the measures taken to eradicate the hookworm; and the Russell Sage Foundation and Carnegie institutions and the

Social Survey. All health and social economy displays made by commercial firms will be housed in the five-acre Mines building, along with an exhibit by the federal government covering work done for the health and safety of miners.

Another exhibit of importance to the medical and surgical world is the model emergency hospital which the exposition already has installed. It is in charge of Dr. R. N. Woodward, superintendent of the United States Marine Hospital in San Francisco, and will be maintained by the United States Department of Health, although most of the equipment—which represents the highest achievements in sanitary appliances—has been contributed by various manufacturers. As in all other exposition departments, practically all these displays are products of the past decade. This hospital exhibit includes model automobile ambulance, a sterilizing room, an X-ray room, a library, operating chairs, surgical instruments and equipment, a drug room and the like. It will be used as the exposition emergency hospital.

Included in the series of 221 international and national congresses and conventions of learned, scientific, industrial, ethical and other bodies which already have voted to hold their sessions at the Panama-Pacific International Exposition, are many conventions having to do directly with public health and hygiene. Among participants will be the American Academy of Medicine, the National Commission on Mental Hygiene, five organizations of eye, ear, nose and throat specialists, various societies for the elimination of tuberculosis, cancer and other diseases, the Panama-Pacific Dental Congress which will bring over 3,000 delegates with a clinic of 25 to 50 chairs, beginning September 9; the American Red Cross Association, and the International Congress of Nurses, which will be represented by 6,000 nurses from fifteen countries. Affiliated with this nurses' congress, which last met in Cologne in July, are the American Nurses' Association with 22,000 members, the National League for Nurses' Education with 12,000 members and the National Organization of Public Health

Nurses. This congress will bring an elaborate series of exhibits including late hospital equipment, model wards, a Florence Nightingale exhibit and a model hospital mortuary as developed in Europe.

It is probable that the American Medical Association also will hold its 1915 sessions at the exposition, although definite action is yet to be taken. It will be at least represented in the Palace of Social Science by a valuable exhibit covering the work of the Association in educational and legislative work, particularly looking to the elimination

of quacks and fake medical schools and adulterated and fake medicines and drugs.

The sessions of all these bodies will be held for the most part in the new permanent Auditorium which the Exposition is erecting at a cost of \$1,065,000, and which has a seating capacity of 10,000 in its main hall, with eleven subsidiary halls. The Festival Hall, with a seating capacity of 3,000, and the Greek Theatre at the University of California, seating 12,500, visible across the bay from the exposition grounds, also will be used for these vast congresses.

PERSONAL NOTES.

The following persons were elected to membership in the Association, August 19, 1914:

Leverett Dale Bristol, M.D., University, N. D.

William Haskins Coburn, Winthrop Centre, Mass.

Malcolm Lewis, Topsfield, Mass.

Porter Perry Pillans, M.D., Orlando, Fla.

George Washington Simons, Jr., Boston, Mass.

John Archibald Smith, M.D., Saranac Lake, N. Y.

Bronson Ewing Summers, M.D., Richmond, Va.

Augustus Baldwin Wadsworth, M.D., Albany, N. Y.

Earle Lytton Waterman, State College, Pa.

Frank Aylmer Woods, M.D., Holyoke, Mass.

President Woodward of the American Public Health Association has appointed the following committee to consider the proposed model law for morbidity reports:

Dr. J. W. Trask, U. S. Public Health Service, Washington, D. C.

Dr. L. I. Dublin, Metropolitan Life Insurance Co., New York City; and

Dr. S. J. Crumbine, Secretary, State Board of Health, Topeka, Kan.

INDUSTRIAL HYGIENE AND SANITATION.

Night Work for Women.

The question of the employment of women at night has recently come before the courts in the action of the People of the State of New York against the Charles Schweinler Press. Along with this legal question there has been prepared a general brief, a most valuable social document, which is a compilation of the world's experience upon which the legislative prohibiting of night work is to be based.

In the July number of the *Medical Review of Reviews* there is an editorial summarizing this brief, part of which is herewith quoted.

"Particularly valuable is that section of the brief which deals with The New Strain in Manufacturing. Speed, monotony and the feverish activity of piece work, all intensify the nervous strain of modern industry. A general predisposition to disease is produced and exhaustion makes workers more susceptible to the infectious diseases. Neurasthenia is constantly imminent and nervous breakdowns are so frequent as to be classed by many social workers and clinicians as modern occupation diseases.

"Obviously, the physical deterioration of women is of paramount importance to the state because of its relation to the workers of the next generation. The loss of human energy is in itself a national wastage, but deficiencies in the nervous system, which may possibly manifest themselves in the offspring of the workers, strike at the future industrial assets of the country. The preservation of the health of the women conditions the welfare of a large proportion of the mothers and children of the future. The overwork of potential mothers impairs the efficiency of the community. Social welfare, therefore, demands the elimination of all causes which tend to undermine the physical, mental and moral health of our feminine industrial workers.

"Night work for women is already prohibited to a greater or less extent in Massa-

chusetts, Indiana, Nebraska, Pennsylvania, Oregon, South Carolina and Connecticut. The foreign legislation upon this subject indicates marked restrictions in the employment of women at night work in Switzerland, Austria, Netherlands, Germany, France and Great Britain, as well as Spain, Portugal, Sweden and other foreign States.

"The dangers of night work for women are obvious, owing to their general anatomical structure and special nervous organization for adequately functioning as mothers. Defective or deficient sleep during the day time, the lack of sunlight and the general nervous strain of night employment, together with the loss of family life, the dangers to which they are exposed physically and morally by night work bear strong testimony to the necessity of eliminating night work for women.

"While the world's experience is in favor of this new legislation, it is necessary to stir the social conscience of the community to the importance of supporting all endeavors to protect our female workers. There is no more important social legislation to be contemplated in connection with pre-natal work than the proper restriction of the hours of labor of potential mothers and pregnant workers. In order to establish adequate restrictions, the law should fix the opening and closing hours, before and after which, the employment of women is illegal. The attitude of the public should create an atmosphere favorable to the passage of such conserving social legislation."

Labor Camp Life—Its Evils.

Scattered over the continent, separated from industrial centers, are groups of workers living under conditions called labor camps. Employment in labor camps is usually seasonal or casual. Because the employment is of but brief duration and because the camps do not come under general observation, very little consideration has been given to the

health conditions prevailing among the camp workers, nor is the consequent menace to the health of the community generally appreciated.

The Wisconsin Industrial Commission has recently made a report on Wisconsin labor camps which ought to arouse other states to the necessity of making similar investigations. In describing railroad camps this statement is made:

"Sanitary precautions in railroad camps consist mainly of printed instructions to the camp clerks and cooks which are commonly disregarded. Surroundings of camp very bad. Odors plentiful. Everything left over from food seemed to have been thrown out of the cars without any care whatever. Both front and rear of camps bad. Within ten feet of camp is ditch full of water drained from swamp nearby. This full of garbage, old clothes, etc. Thick scum on water. Plenty of flies."

The utter disregard of the most elementary principles of sanitation results in swarms of flies, germs, and parasites which serve as carriers of infectious diseases. The beds in the bunk cars are usually in a terrible condition. The laborers, who do not expect to stay long, do not trouble themselves about conditions; those in charge of the camps shift responsibility upon the men. The public seems uninterested in locating original responsibility for insanitary conditions or in protecting itself against the spread of disease.

For there is a constant stream of laborers going to and from the camps. They carry to industrial centers menace from the dirt diseases of the camps.

State laws should require reporting of diseases in labor camps. Provision should be made for locating the origin of such diseases and for prevention. Sanitary regulations should be prescribed, provisions for proper housing, hospital and medical attention. These standards should be enforced by official agents and by the demand of the workers themselves. Camps can be made perfectly sanitary as even the temporary one-night camps of the army demonstrate.

The menace that labor camps constitute not only to the workers in the camps but to the members of society to whom the infec-

tions from the camps are carried was presented to the representatives of organized labor at the Toronto convention of the American Federation of Labor in a resolution by Delegate D'Allessandro. The resolution provided for an effort to secure federal legislation and regulations to protect these workers, and for similar action by state legislatures. A bill for this purpose was introduced in Congress, but was not enacted into law. Several state legislatures have considered propositions to protect the workers in labor camps, but little has yet been accomplished.

Meanwhile the number of labor camps and the danger from them has constantly increased. Although the organization of these casual, migratory workers presents many difficulties, it is the only sure method of protecting them and society. Only intelligent self-help will enable the laborers to secure fair treatment for themselves, though governmental regulation is necessary to safeguard society. Both purposes should be urged to immediate fruition. In these efforts it is not only the duty but the pleasure of organized labor to render every aid within its power.

American Federationist, July, 1914.

Investigations of Industrial Hygiene by Public Health Service.

A note in the *Modern Hospital* for June sums up briefly the recent special bulletin of the Public Health Service which tells of active operations in the service as follows:

TUBERCULOSIS AMONG CINCINNATI EMPLOYEES.

Investigations of industries in relation to tuberculosis have been undertaken in Cincinnati, Ohio. These studies include medical examinations of employees engaged in various industries, inspection of morbidity and mortality records, inquiries into sanitary and economic conditions, etc. Three medical officers are now engaged in this work.

WORKING WOMEN IN INDIANA.

At the request of the Indiana Commission on Working Women, a sanitary survey of ninety-six factories has just been completed in that state to determine the sanitary conditions surrounding the employment of

women in industrial establishments located in thirteen different cities.

GARMENT WORKERS OF NEW YORK CITY.

A more comprehensive investigation is now in progress in New York City, request for which was made by the Joint Board of Sanitary Control of the Garment Workers' Trade. The purpose of this investigation is to study the sanitary conditions of the industry and determine the physical condition of the persons employed in it. Three medical officers of the service are in charge of this work, the temporary services of the necessary number of female physicians having been obtained.

METALLURGICAL INDUSTRIES.

In coöperation with the United States Bureau of Mines, an officer is now at Pittsburgh studying the sanitation of metallurgical plants in that district.

In coöperation with the same bureau, the studies of sanitation of metal mines and the prevalence of lung diseases among miners, previously undertaken, have been resumed. An officer is now visiting the mining districts of Montana, Colorado, and other Rocky Mountain states for the purpose of collecting data in regard to this subject.

Sanitary Code for Bakeries and Confectioneries.

Among the various sanitary codes issued by the Industrial Board of the New York State Department of Labor, is one containing rules and regulations relating to sanitation in bakeries and confectioneries. In the rules are also printed extracts from the Labor Law which applies to all factories and which are amplified in this pamphlet.

The rules of this code cover the construction of bakeries and candy shops in such a manner as to prevent the collection of dust and filth. The materials used in construction must be such as to be easily cleaned. Floors have to be cleaned daily and scrubbed at least once a week.

The question of ventilation of bakeshops and candy shops where the products are fried or boiled over an open stove is well covered. Ventilating hoods are required to carry off the odors and vapors.

The code contains very strict rules con-

cerning the sanitation of waterclosets and sinks. The cleanliness of these two appliances is of unquestioned importance in such places where food is manufactured. For every ten employees or less who are employed in one shift there must be provided a sink with two spigots for hot and cold water. Soap must be provided in some form although liquid soap is suggested. Also nail brushes must be provided and each employee is to have one clean towel a day. The workmen must wash their hands with soap and water before starting work, after meals, after having used the watercloset or urinal and also it is suggested that they be washed when changing from one part of the process to another.

There are also very broad rules concerning the disposal of garbage and refuse, methods used during the operation of baking and cooking and of the care of the raw material and finished product.

There is also a rule concerning the medical inspection of employees handling food certifying that the person is free from "such contagious, infectious, communicable or skin diseases as the Public Health Council may deem necessary for the safeguarding of the public health."

The nature and scope of this code commends itself highly for general use, since the sanitation of food-preparing industries is of great importance in the control of the spread of communicable diseases.

Social and Industrial Conditions.

The Industrial Economics Department of the National Civic Federation, New York City, is conducting a survey of present social and industrial conditions in the United States as contrasted with those of about thirty years ago. In connection with this a special committee is making a study of employers' welfare work. The committee's report is to contain information in regard to type of work place (structural matter and method of heating and cooling); sanitation as regards drinking water, ventilation, light, wash rooms, toilet rooms, shower rooms, locker rooms, lunch rooms, fire protection, seats for women, uniforms, laundry, elevator service, janitor service, emergency hospitals

and accidents and safeguards. Another branch of the service covers recreation, education, housing of employees (in their own homes), additions to wages (profit sharing), provident funds, supervision of welfare work.

Safety Engineering, July, 1914.

Industrial Accidents in Massachusetts.

The first annual report of the Industrial Accident Board of Massachusetts is a document of 336 pages for the period July 1, 1912—June 30, 1913, the first year of the operation of the workmen's compensation law. Included is a statistical digest of 90,168 accidents in the industries of the state, with a statement of the causes of injuries. The titles of some of the chapters are: Aids to Accident Prevention, Attitude of Employers and Employees toward the Act, The Dangers of Workmen's Compensation, Gallery of Injured Employees, Insurance as a Public Utility, Insurance Benefits under the Act, Insurance Companies and Accident Prevention, The Medical Problems of the Act, Necessary Immediate Amendments to the Act, Rulings and Decisions under the Act, Safety and Health Promotion.

The report has suggestions in regard to the prevention of industrial accidents, in connection with the statements that the insurance companies filed with the board of their work in the prolific field of endeavor. Every plant should have its accident prevention department, and it should be the duty of a capable person to investigate and study into the cause underlying every accident, with the purpose in view of preventing a similar injury in the future.

The conclusion of the board is: "We must make the obligation to safeguard (and this includes sanitation and industrial hygiene) rest upon the employers and machinery makers, and not upon the inspector, who can never be other than occasional skilled visitor, reporter and adviser."

Safety Engineering, July, 1914.

An Important Decision.

In the June number of the *Bulletin of the Ohio State Board of Health* are noted some important judicial decisions, giving the

opinion that an "occupational disease" is a "personal injury." The decisions referred to are those of Common Pleas Judge O. J. Cosgrave, handed down, May 16, in the suit of David Brown against the Industrial Commission of Ohio, which had refused Brown compensation for disability resulting from lead poisoning contracted in the course of his regular employment.

"Two or three months ago Superior Judge Pugh passed similarly upon this same point, although the case before him was not an appeal from the State Board, but a direct suit against the employer.

"The decision of Judge Cosgrave is of vast importance, as it means that his findings will be taken to the Supreme Court for final review, the state making it a test case upon the question of occupational diseases coming under the new Insurance Law for compensating persons meeting personal injury while in the course of their employment.

"Lead poisoning happens to be one of those specific occupational afflictions in which the lack of personal hygiene is, perhaps, the greatest contributory factor, for, unless the person himself observes certain common sense precautions, no machinery nor appliance can be made sufficiently fool-proof to prevent lead poisoning. Personal susceptibility is also a marked factor.

"In addition to the fact that employers should take all reasonable means to find and reduce lead dust, gases and fumes, it will be very advisable to have a physician examine the gums and inquire into sickness complaints of every employee exposed to lead, at regular monthly intervals. This is the routine adopted abroad, and must eventually come in this country. The present Ohio 'Lead Law' specifies this, but so far the law only covers the manufacturing of certain lead compounds. The compounding and mixing of these substances is, in most instances, just as dangerous as their manufacture."

Preventing Industrial Accidents.

Industrial hygiene should not only deal with causes and results of disease and sickness due to improper environment but also with the broader field of prevention of bodily injury from any cause including injury due

to accidents as well as to disease. The following clipping was taken from *Safety Engineering* for July and discusses the question of industrial accident prevention.

"All will agree that accident prevention is a paying investment. The interest of the state demands the good citizenship and highest efficiency of every worker. The prevention of accidents and welfare work in factories will make the worker more efficient on account of being relieved from worry and fear of sickness and accident which will reflect upon the worker and his family. This can be accomplished by safety committees in each establishment, composed of the foreman and the workmen themselves, who will hold meetings and consider all matters pertaining to the best method of preventing accidents and safeguarding employees, making regular weekly inspections and suggestions along that line.

"Every firm or corporation should aim to better the condition of workmen in respect to sanitation and welfare work by establishing sanitary drinking fountains in numerous places, and urinals and water closets in many localities rather than one, or two larger ones, as the saving in time alone will very soon pay for their installation.

"It is not enough to appeal to the motives of humanity among employers. They must see that it is a business proposition to invest in safety appliances, because the prevention of accidents and injuries by all possible means is a personal duty which every one owes, not only to himself, but also to his fellow workmen.

"To prevent accidents we must use all possible force and ingenuity in the right direction by a regular system of education and agitation so that we may secure the cooperation of all concerned.

"A scientific but practical inspection system is one of the greatest requirements for a proper solution of this problem, but no scheme can be complete or satisfactory without arousing the public interest, as well as the mind of the worker, of the importance of averting accidents.

"One most important requirement in the

direction of efficiency in carrying out the workmen's compensation law is prompt and proper attention to all injuries. It will save much suffering, many lives and limbs, and a great deal of money.

"Proper signs and bulletins, calling attention to dangerous places or localities, will cause workmen to think before they act. It also teaches them to rely upon safety devices and keeps the thought fresh in their memories.

"But we must be just to the workers, and also just to the employers that they may not be unnecessarily burdened."

Paint Vapors.

The nauseating effects produced by the odor of fresh paint are well known. This odor is often associated with lead, which forms the base of the majority of paints.

Henry A. Gardner in the February *Journal of Industrial and Engineering Chemistry* says, that a series of tests carried on by him showed that the vapors from paint apparently contain carbon monoxide, in amounts varying with the type of pigments used.

Mr. Gardner goes on to say that the definite presence of aldehydes and organic acid substances in paint vapors has also been established by these tests and concludes that:

I. When linseed oil or similar oils are spread in thin layers, the absorption of oxygen which takes place is accompanied by the evolution of considerable amounts of carbon dioxide and organic substances. Carbon monoxide is also evolved in small amounts.

II. Oil paints containing lead or zinc pigments do not emit volatile compounds of a metallic nature.

III. Drying paints evolve water-soluble acid substances such as formic acid, as well as acid substances which are apparently of a fatty nature. Carbon dioxide and carbon monoxide are also present in the vapors from the drying paint. The type of pigment used in the paint may directly affect the amount and character of the volatile substances produced. Basic pigments appar-

ently stimulate the evolution of such products.

IV. Aldehyde substances are present in the vapors from drying oil paints. These substances probably have a marked bacterial effect upon pathogenic bacteria and would thus account for the sanitary value ascribed to oil-pigment paints.

Electrica Ophthalmia.

The April issue of the *Illinois Factory Inspection Bulletin* contains a very interesting article on the occurrence of electrica ophthalmia.

This disease is caused by exposure of the eye to electric light rays, which have a superabundance of the ultra violet rays. Complications of many different sorts may ensue. In regard to diagnosis the author says that this is usually made by the workman himself, for he enters the hospital or dispensary and states that he has had a flash, meaning that he has troubles with his eyes due to an electrical flash.

An interesting history of fifty cases is given and the article closes with a discussion of the etiology, pathology, symptomatology and treatment of the disease.

Table of Causes of Grinding Wheel Breakages.

The Norton Company of Worcester, Mass., publishes in the February issue of *Grits and Grinds*, a very interesting table emphasizing the known causes of grinding wheel accidents.

Space will not permit here to reproduce the entire table, but it may be of interest to review a few of the more important.

Broken wheels (caused, by)	Cracked wheel (Caused by)	{ Dropping. Heated spindle. Only one flange. Missing washers. Tightening of nut. Hacking of wheel. Over speed. Improper specifications. Equipment incorrectly erected. }
Flying wheel (caused by)	mounted so that nut works loose	
Flying particles of emery, inhaled or in eye (caused by)	Defective exhaust. Eye protection insufficient.	
Flying pieces of broken revolving type of dresser (caused by)	No guard for dresser.	
		{ No goggles provided. Goggles not used. }

Industrial Hygiene Division of the New York Department of Labor.

Hon. James M. Lynch, Commissioner of Labor of the State of New York has recently perfected the organization of the Division of Industrial Hygiene in connection with the Department of Labor.

The Division consists of a chief medical inspector, three medical inspectors, one of whom is a woman; a chemical engineer, a mechanical engineer, a civil engineer and an expert in fire prevention. There are also some fourteen inspectors, who are known as special investigators.

The labor department of this state was the first to establish such a division in full working order and was the first to undertake investigating and doing analytical work directly in connection with the labor department, having been the first in this country to establish a laboratory of industrial hygiene in connection with the labor department, and doing analytical work and publishing statistics.

CURRENT PUBLIC HEALTH LITERATURE.

AMERICAN.

Boston Medical and Surgical Journal.

LXXI, No. 6. August 6.

Problem of Infection in Tuberculous Families. J. B. Hawes.

American Journal of Tropical Diseases and Preventive Medicine, New Orleans

II, No. 1. July.

Late Outbreak of Plague in Havana. A. Agramonte.

Engineering Record

LXX, No. 4. July 25.

Tunnel Intake for Milwaukee Waterworks. J. A. Mesiroff.

Cost of Water in Milwaukee.

LXX, No. 5. August 1.

Imhoff Tank Operation at Chambersburg. C. F. and P. E. McBres.

Results of Water-Clarification Plant at St. Louis. Sanitary Experts Answer Joint Commission's Questions

The Auburn Water Case.

LXX, No. 6. August 8.

Small Rapid Filter Plant at Port Clinton, Ohio. Sewage Disinfection in Actual Practice. W. F. Orchard.

Paris Contemplates Additional Water Supply.

Kentucky Medical Journal, Bowling Green.

XII, No. 13. July.

Public Health Problems of Kentucky. D. P. Curry.

Journal of Infectious Diseases, Chicago.

XV, No. 1. July.

Classification of Pathogenic Streptococci by Fermentation Reactions. J. G. Hopkins and A. Lang.

Anaerobic Cultures in Scarlet Fever. G. F. Dick and G. R. Henry.

The Characteristics of Bacteria of the Colon Type Found in Bovine Fevers. L. A. Rogers, W. M. Clark and A. C. Evens.

The Relationship of Septic Sore Throat to Infected Milk. J. A. Capp and D. J. David.

Studies on the Sanitation of Swimming Pools. W. A. Manheimer.

The Quinin Treatment of Rabies. G. Cummings. Studies on the Classification of the Colon Group. I. J. Kligler.

Journal of Medical Research, Boston.

XXX, No. 3. July.

The Effect of Quinine on Rabbits Inoculated with Rabies. L. Frothingham and J. Halliday. Serum Cholesterol and the Wasserman Reaction. O. Klatz.

The Staining of Yeasts by Gram's Method. A. T. Henrici.

Notes on Two "Atoxic" Strains of Diphtheria Bacilli. H. R. Brown and T. Smith.

The Reaction of the Guinea Pig to the Virus of Typhus Fever. J. F. Anderson.
On the Classification of the Streptococci. H. W. Lyall.

Journal of the American Medical Association.

LXIII, No. 4. July 25.

The Necessity for the Establishment of a National Leprosarium. W. C. Rucker.

The Duty of the Government in Leprosy, Care and Control. Isadore Dyer.

A Comparison of Cholesterinized and Non-Cholesterinized Artificial Antigens in the Wasserman Reaction. C. C. W. Judd.

LXIII, No. 5. August 1.

Notes on Cases of Sprue Invalidated from the Tropics; Will it Become Endemic Here? H. B. Hiatt and W. Allen.

LXIII, No. 6. August 8.

A Statistical Study of Syphilis, the Relation of Its Symptoms to Subsequent Tabes Dorsalis or General Paralysis. C. J. White.

Syphilis in the American Negro. H. H. Hazen. Observations on the Pathology of Syphilis. H. J. Nichols.

LXIII, No. 8. August 22.

The Medical School and the State. H. S. Pritchett. Public Health Work as a Career. J. A. Terrell.

New Mexico Medical Journal, Las Cruces.

XII, No. 3. June.

Final Report on Epidemic of Typhus Fever among Navajo Indians at Canoncito Cojo. L. C. Day.

New Orleans Medical and Surgical Journal.

LXVI, No. 12. June.

Epidemiology of Whooping Cough. H. D. King.

Medical Record, New York.

LXXXVI, No. 4. July 25.

Method of Treatment for Diphtheria Carriers. H. R. Miller.

Military Surgeon, Chicago.

XXXV, No. 1. July.

Veneral Prophylaxis from December, 1913, to April, 1914, at Fort Washington, Md., for Purpose of Showing Its Efficiency. M. Ashford.

Philippine Journal of Science, Manila.

IX, No. 1. February.

Cockroaches and Ants as Carriers of librios of Asiatic Cholera. M. A. Barber.

IX, No. 2. April.

Sanitary Survey of San José Estate and Adjacent Properties, with Reference to Epidemiology of Malaria. W. E. Musgrave, et al.

Public Health Journal—Toronto.*V, No. 7. July.*

Practical Application of Wasserman Test in Public Health Work. J. H. Laidlow.

Public Health Reports, Washington.*XXIX, No. 30. July 24.*

Plague in New Orleans.

The Notifiable Diseases: Prevalence in 1913 in Cities over 100,000.

XXIX, No. 31. July 31.

Plague in New Orleans.

Morbidity Reports. A Striking Illustration of Their Necessity.

School Hygiene—A Report of a Sanitary Survey of Schools and of Medical Inspection of School Children in Certain Sections of North and South Carolina.

XXIX, No. 32. August 7.

Plague in New Orleans.

Tuberculosis—Its Control in Minnesota.
Safe Ice.

XXIX, No. 33. August 14.

Plague in the United States.

Measles and Its Control—Each Case a Possible Epidemic.

Studies on the Self-Purification of Streams.

FOREIGN**Journal of Hygiene, Cambridge.***XIV, No. 1. April.*

The Range of Flight of *Musca Domestica*. E. Hindle and G. Merriman.

The Influence of Ocean Spindrift and Blown Spray on the Chlorine Content of Inland Ground Waters. W. Barr.

XIV, No. 2. July.

On the Conditions under which Discontinuous Events May be Employed as a Measure of Continuous Processes, with Special Reference to the Killing of Bacteria by Disinfectants. T. B. Robertson.

Agglutination Experiments with Typhoid Bacilli Isolated from the Body. A. Patrick.

The Resistance of Vaccine Virus to Filtration. A. B. Green.

Journal of State Medicine, London.*XXII, No. 7. July.*

Human and Bovine Tuberculosis—Treatment by Special Kinds of Tuberculin. N. Raw.

Feeble-Minded Children. M. Dendy.

Dental Clinics. L. W. Williams.

Medico-Pedagogic Methods in Primary School Education. J. Arrowsmith.

Wiener Klinische Wochenschrift.*XXVII, No. 27. July 2.*

The Public Health Service in Egypt. E. Weiner.

AMERICAN JOURNAL OF PUBLIC HEALTH

STREAM POLLUTION AND PRESENT STATUS OF CONTROLLING LEGISLA- TION IN CALIFORNIA.

CHARLES GILMAN HYDE,

Consulting Engineer, California State Board of Health.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

INTRODUCTION.

Area and Extent of State. The state of California has a gross area (exclusive of that portion of the shore of the Pacific Ocean over which jurisdiction is exercised) of about 158,300 square miles. The net land surface is approximately 155,650 square miles. In area the state is the second largest in the United States, ranking next to Texas, which, however, has a land area nearly 70 per cent. in excess of that of California. The land area of California is somewhat in excess of the combined areas of the six New England States together with New York and Pennsylvania.

The state is somewhat irregular in shape and its dimensions are not readily expressed. It has a general length of about 780 miles and a maximum length, in air-line measurement from the northwest to the southeast corners, of fully 860 miles. The shore line is stated to be more than 1,000 miles in length. The maximum width of the state is about 260 miles, the minimum width about 140 miles and the general or average width in the neighborhood of 200 miles.

In latitude the state extends from about 32° 30' north to 42° 0' north. Points representing equivalent positions on the Atlantic seaboard are respectively located about twenty miles south of Charleston, S. C., and about thirty miles south of Boston, Mass.

Population. The total population of the state in 1910 was about 2,377,500 persons, and the average density per square mile of land area was only 15.3. In respect to total population, California ranked as twelfth among the forty-eight states. In respect to average density of population this state ranked as thirty-fifth, having only about 3 per cent. of that in Rhode Island, 3.7 per cent. of that in Massachusetts and 4.5 per cent. of that

in New Jersey, these three states being, in the order given, by very far the most densely populated states in the United States.

There were eight cities in California, according to the census of 1910, which had a population of at least 25,000. The aggregate population of these cities was about 1,070,000, equivalent to about 45 per cent. of the entire population of the state. In 1910 the population immediately adjacent to San Francisco Bay was about 750,000 and that in and adjacent to Los Angeles fully 500,000, making a total of about 1,250,000 people, or more than 53 per cent. of the state, within these two relatively small areas of comparatively dense population.

From practically the entire population adjacent to San Francisco Bay, the sewage is being or is proposed to be discharged into the waters of the bay whose tidal prism is very large. A large proportion of the population in Los Angeles and vicinity do now or will eventually dispose of sewage more or less directly into the Pacific Ocean. It is estimated that in 1910 fully 1,210,000 people, or 52 per cent. of the total population of the state, were either delivering sewage into the Pacific Ocean directly or into San Francisco Bay, or else were living in communities which will so dispose of sewage. This estimate is only approximate, but is probably sufficiently close to serve present purposes.

At this date there are 231 incorporated cities and towns and at least three sanitary districts in the state. In 1910, San Francisco, the largest city, had a population of about 417,000 people and Los Angeles, the second city, a population of about 319,000. Oakland, with a population in 1910 of about 150,000 inhabitants, is the only other city in the state having a population greater than 100,000. In 1910 there were five cities having populations between 25,000 and 50,000, thirteen between 10,000 and 25,000, ten between 5,000 and 10,000, thirty-four between 2,500 and 5,000 and sixty having less than 2,500 inhabitants. The aggregate population of the 125 cities so represented was about 1,539,000, or about 64.7 per cent. of the total population of the state.

River Systems. There are sixteen principal river systems in the state with independent outlets into the ocean, bays or inland basins. In addition there are very many smaller streams, both tributary to these river systems and with independent outfalls. The largest river system is that of the Sacramento River, which embraces in its drainage basin approximately 2,200 square miles in the state of Oregon and about 24,900 square miles in California, a total of 27,100 square miles. This area is comparable in size with that of the drainage basin of the Susquehanna River, which is about 27,400 square miles in extent and which is the largest river system discharging into the Atlantic Ocean between the Gulf of St. Lawrence on the north and the Gulf of Mexico on the south. The second largest river system in California is the San Joaquin which, without the streams deliver-

ing into Tulare Lake Basin (under existing conditions a practically independent inland basin without an outlet), embraces a total drainage area of 18,300 square miles; with these southerly streams a total area of 30,900 square miles is embraced.

Topography. The State of California is extremely diversified and is mountainous throughout. It is traversed, "in a general northwest-southeast direction, by two distinct and approximately parallel ranges of mountains, which extend almost the entire length of the state. Near the eastern border is the Sierra Nevada; not far from the shore line on the west is the coast range. These two ranges merge into each other about forty miles south of the California-Oregon boundary line, the meeting point being Mount Shasta, which has an elevation of 14,380 feet. They are merged again south of Bakersfield by a cross range known as Tehachapi Mountains."*

Practically all of the great valleys of the state are surrounded by mountain ranges, none of which have peaks less than 3,000 or 4,000 feet in height, while some have peaks rising to elevations as great as from 8,000 to 14,500 feet. In the more arid sections of the state the water courses are naturally at considerable distances apart and in these sections cities have developed in locations remote from any body of water, flowing or quiet. The mountain ranges in the state are controlling factors in rainfall, both as respects distribution and total annual depth.

Climate. The climate of California may be roughly described as wet and dry, the seasons being really two in number, namely a wet season, generally embracing the months from October to March, and a dry season, extending from April to September, inclusive. Of course, there are exceptions to this statement, rain falling in the higher mountains practically throughout the year while but small rainfall occurs on the arid plains and that during a very short interval only in the year. Generally speaking, the rainfall in the northerly portion of the state is much heavier than that in the southerly.

The long dry seasons have a decided effect upon stream flow and many streams in the state, especially in the southern portion, are intermittent in character. These streams would naturally, of course, produce extremely difficult problems in the matter of sewage disposal by dilution.

Throughout the state, except at the higher altitudes (4,000 feet and over), the climate is mild, winter temperatures seldom being maintained for continued intervals much below the freezing point. The climate is, therefore, particularly favorable to all biological processes of sewage treatment and disposal. Indeed, in certain types of sewage pre-treatment devices, difficulties are sometimes encountered due to excessive biological activity. On account of the dryness of the climate in many portions of the state,

*Trans. Am. Soc. C. E. Vol. LXI, Dec., 1908, p. 283.

sewage disposal by irrigation, either with or without pre-treatment, according to conditions, is a frequent, popular and oftentimes satisfactory procedure.

SEWERAGE AND SEWAGE DISPOSAL IN CALIFORNIA.

Sewer Systems. Data with respect to the sewerage and the treatment of the sewage of municipalities, institutions, industrial establishments, resorts, etc., are meager and have never been officially compiled by any authority with competent jurisdiction. The data submitted herewith, therefore, must be considered as tentative and provisional, subject to considerable revision. The statistics presented are mainly those gathered in various ways by the writer acting as consulting engineer for the State Board of Health. At this date a painstaking canvass of the sewerage and sewage treatment situation with respect to incorporated communities is in progress and the data applying thereto will be available in the near future.

From the information at hand it appears that among the 231 incorporated places and three incorporated sanitary districts there are 160 communities with more or less complete public sewerage systems, ten communities with private sewers serving a considerable portion of the population and sixty-four places in which no systems have yet been introduced. There are at least five unincorporated places having public sewerage systems.

The total populations represented in the several classes of communities above noted was, in 1910, about as follows: incorporated communities (including sanitary districts) having public sewerage systems, 1,580,700; incorporated places having private sewers, 10,200; incorporated communities having no sewers, 72,400; unincorporated places having public sewers, 5,100. The population of all communities now known to have more or less complete sewerage systems was, in 1910, about 1,596,000 or 96 per cent. of the total population of incorporated communities and sanitary districts and 67 per cent. of the total population of the state.

Sewage Disposal. The incorporated communities of the state represented as having sewerage systems, public or private, may be classified, according to the current methods of sewage treatment and disposal, as follows:

TABLE No. 1.

SUMMARIZED STATISTICS RELATING TO THE SEWERAGE AND SEWAGE DISPOSAL OF INCORPORATED CITIES AND TOWNS AND SANITARY DISTRICTS IN CALIFORNIA—OCTOBER, 1913.

<i>Sewerage Systems:</i>	Number	Pop. 1910
Municipalities—		
Having public sewerage systems.	157	1,577,100
Having private sewerage systems.	10	10,200
Without sewerage systems.	64	72,400
Sanitary Districts—		
Having public sewerage systems.	3	3,600
	234	1,663,300

Sewage Treatment and Disposal:

Disposal of raw or untreated Sewage—

Into inland fresh-water streams, lakes, etc.....	27	117,100
Into tidal bays, estuaries, etc.....	37	787,100
Into ocean at coast.....	9	347,500
Through pre-treatment processes.....	89	284,600
Through final treatment processes directly.....	9	58,600
No information.....	1	2,300

172 1,597,200

Duplicates..... 2 6,300

170 1,590,900

Disposal of Pre-treated Sewage—

Into inland fresh-water streams, lakes, etc.....	32	76,100
Into tidal bays, estuaries, etc.....	2	3,100
Into ocean at coast.....	9	55,000
Through final treatment processes.....	40	143,200
No information.....	6	7,200

89 284,600

Nature of Preparatory Treatment—

Through septic tanks.....	79	224,000
Through Imhoff tanks.....	6	13,800
Through septic tanks and Imhoff tanks.....	1	30,300
Through settling tanks.....	2	8,700
Miscellaneous.....	1	7,800

89 284,600

Nature of Final Treatment (supposedly stable effluents —

Sewer farms and irrigated lands.....	46	195,400
Contact beds.....	3	4,700
Intermittent sand filters.....	2	3,900
Sub-Surface irrigation.....	1	1,000
Chemical disinfection.....	1	2,500

53 207,500

Duplicates..... 4 5,700

49 201,800

Sewer Farms and Irrigated Lands—

Disposal on publicly owned lands.....	29	115,700
Disposal on privately owned lands.....	9	40,500
Disposal on both publicly and privately owned lands.....	3	32,300
No information.....	5	6,900

46 195,400

From the table it will be observed that the population in incorporated communities disposing of raw sewage in bodies of water, either fresh or salt, is approximately 1,251,700, or about 78 per cent. of the total popu-

lation in communities having public or private sewerage systems. Only about 117,100 persons, however, live in communities which discharge crude sewage into inland waters. The population in communities having preparatory sewage treatment is about 284,600, while that in communities which have some final method of treatment, as indicated, is about 201,800.

STREAM POLLUTION IN CALIFORNIA.

Pollution of Surface Waters by Community Sewages. The majority (46 out of 68) of the communities having sewerage systems and situated upon the inland waters of the state have installed sewage treatment plants. Ten of these places utilize sewer farms, one has intermittent sand filters, one has contact beds and one has chemical disinfection of a septic tank effluent. Forty-six places in California are disposing of all or a major portion of their sewage by the irrigation of publicly and privately owned lands. Thirty-six of these places are not located on inland water courses. The two largest cities in the state on such waters, namely Sacramento and Stockton, have not yet undertaken sewage treatment but plans for doing so are now under way in both cases and reasonably effective treatment will probably be given within a short time.

There is no stream of consequence in the state of California which may be said to be grossly polluted with sewage. No river of any consequence receives at any point, so far as is known to the writer, a quantity of sewage sufficient to produce a real nuisance. There is a number of cases of small communities on very small streams where sewage or sewage effluents are discharged in a way which may produce nuisances of a local character only, during a portion of the year. Considering the state as a whole, it may be said that the æsthetic and sanitary condition of streams is at present fairly satisfactory. Nevertheless, with the program which is proposed by the State Board of Health for the control of the purity of inland waters under newly enacted legislation, it would appear to be perfectly safe to assume that conditions will be improved rather than otherwise. In this connection it should be remembered that, at the present time, the population in the state is relatively very sparse and that the extended areas of comparatively dense population are tributary to salt and not to fresh water.

It is hoped that as the state develops in population and the tendency toward stream contamination would naturally become greater, the machinery for safeguarding the purity of all waters, both inland and salt, will have become so thoroughly developed and so effective that satisfactory conditions will continue for all time.

Pollution of Surface Waters by Trade Wastes. California is not as yet a state of great industrial developments. The number of manufactures and industries represented is still comparatively small. Aside from the industries named below most of those which have been established in the

state are in communities tributary to large bodies of salt water and not upon small inland streams. The greater industries of the state which at all affect the quality of surface waters are lumbering, mining, canning, tanning, paper making, beet sugar manufacture and oil refining. Certain of our mountain streams have been injuriously affected by sawmill refuse, principally sawdust. This evil may ordinarily be corrected in simple and effective fashion and such remedies will be applied through the joint efforts of the California Fish and Game Commission and the State Board of Health. Certain California streams have been affected by mining in two ways: (a) by débris from hydraulic or placer mining and (b) by slime from stamping and cyaniding works, etc. For the most part this contamination is simply mechanical and is due to suspended mineral matters. Doubtless the effect of cyanide solutions is one of some moment in certain instances, but no investigation thereof has ever been undertaken so far as the writer is informed. Throughout the state many large canneries have been established and the number is increasing rapidly. The cannery refuse problem is becoming large in some quarters, especially where canneries are located on very small water courses and where débris therefrom is discharged directly and without pre-treatment into them. Local nuisances have thus been created in a number of cases, but they are rapidly being corrected under the law applying to nuisances because of complaints of neighbors affected thereby. It will be shown later that the state laws controlling the purity of waters apply to cannery wastes and it is hoped and expected that the State Board of Health will undertake a systematic investigation of the entire cannery problem, locating all canneries in the state with reference to bodies of water and examining these with respect to local pollution and nuisances. Thus far but very few paper mills have been established in the state. So far as the writer is informed there is only one case of serious stream contamination due to paper mill refuse and this occurs practically on the California-Nevada line. The only complaints of nuisance due to this source have been on the part of the California Fish and Game Commission and apply to fish culture. It is expected that this problem can and will be successfully solved. The refuse from beet sugar factories contains very large amounts of suspended mineral and organic matter. The daily discharge of wastes from a sugar factory of average size is about equivalent in volume to the discharge of sewage from a New England City of between 30,000 and 50,000 inhabitants. There are at the present time in California about thirteen beet sugar factories. Very few of these factories (perhaps only one or two, and certainly not more than four) discharge their wastes directly into inland waters. In a number of cases the wastes are used for irrigating adjacent lands, for which they are well adapted and very valuable; in other cases the wastes are carried to the ocean shore.

UNDERGROUND WATER POLLUTION IN CALIFORNIA.

General Conditions. Speaking generally, the underground waters of the state have not become contaminated to any considerable extent. Such pollution as exists is purely local. Ground waters taken from wells sunk beneath large cities may or may not be suitable for drinking purposes, depending upon geological and other governing factors. In the city of Sacramento, for instance, fairly satisfactory drinking waters are obtained from deep wells. Wells sunk in the city of Oakland do not, as a rule, produce satisfactory drinking water. The situation with respect to the pollution of ground waters in California is not unique and the problem does not differ in character from that met elsewhere. In more densely populated areas, problems of ground water contamination become, of course, more complex and serious.

Pollution by Residential Sewage. One serious phase of the local problem is represented by the use, in certain quarters, of deep wells in which to dispose of residential sewage. In the vicinity of Stockton, for instance, it is understood that numerous residences have been provided with small liquefying tanks whose effluents are discharged into ten-inch bored wells, whose depth is determined by the location of porous strata. The depth, therefore, varies, but in some cases is fully sixty feet and perhaps more. It is evident that ground waters taken for drinking purposes from such strata may be seriously affected even though the distance of travel may be considerable.

POLLUTION OF SALT WATERS IN AND ADJACENT TO CALIFORNIA.

Pollution of Ocean and Bay Shores, with Sewage. The majority of coast towns and cities in California dispose of their sewage directly in Pacific Ocean without difficulty. Others have had some difficulty due to the stranding of suspended matters upon beaches in the immediate vicinity of outfalls. The most serious situation in the state is that represented by the main outfall of the city of Los Angeles at a place called Hyperion. Complaints have been made of beach pollution resulting from this method of sewage disposal and the State Board of Health and the City Engineering Department have recommended fine screening of the sewage as a first logical step in correcting this difficulty. Around San Francisco Bay large volumes of sewage are discharged by shore outfalls from the cities of Alameda, Berkeley, Oakland, Richmond, San Francisco, San José and other cities and towns. The sewage from Oakland, Richmond, San Francisco and San José is concentrated at single or only a limited number of outfalls. The outfall locations of San Francisco have been chosen with particular care. In the near future, in Alameda, Berkeley and other cities, outfall changes will be required in the nature of extensions to discharge the sewage into deep water at points where favorable currents are to be found. As

yet very few nuisances, except possibly some of a very limited extent, have been produced by sewage discharged into the bodies of salt water in and adjacent to the state.

Pollution of Salt Waters with Trade Wastes. Perhaps the most objectionable wastes, aside from sewage, discharged into the salt waters of the state, notably San Pablo and San Francisco Bays, are oil wastes of various kinds. These wastes are unsightly because of their color and density, since they are so light that they float upon the surface of the water. They also have a disastrous effect upon fish life. It is understood that the oyster industry in San Francisco Bay, due to the harmful effect of oil and possibly other wastes, including sewage, has already been injured to such an extent that it amounts to-day to only one-fourth of what it was about ten years ago and the conditions appear to be rapidly becoming worse. Similar conditions exist at Monterey and other points where oil is refined or shipped. Some of the shell-fish layings in San Francisco Bay are grossly polluted with sewage.

CONTROLLING LEGISLATION IN CALIFORNIA.

Public Health Act of 1907. The state legislature of 1907 passed an act known as the Public Health Act (chapter 492, Statutes of 1907, Approved March 23) which was devised and fostered by the State Board of Health. As far as the pollution of waters was concerned, this act repeated the provisions of previous legislation and ordered that no party shall discharge wastes, offensive, injurious or dangerous to health, into any body of water used or intended to be used for human or animal consumption or for domestic purposes. It was further forbidden to discharge such wastes upon lands adjacent to such bodies so that they might drain thereinto or to erect structures to discharge such wastes into or near such bodies of water so as to pollute them. The law further provided that no party shall cause or permit any livestock to pollute waters used or intended for drinking purposes. Persons were forbidden to bathe or wash clothes in such waters.

As is too often the case, no machinery whatever was provided to carry out the provisions of the law and, of course, it became ineffectual through default.

Amended Statutes of 1911. In 1911, at the request of the State Board of Health, the legislature passed an act repeating the important provisions of previous enactments and further ordaining that it shall be unlawful for house boats or other boats upon which people might live to moor within two miles of any water works intake. A unique and entirely original feature of this law was the provision that whenever any party desires to discharge or to continue to discharge any such wastes into or near bodies of water so as to pollute them, he must file a formal petition for permission

so to do. The board is authorized to undertake an investigation of each case pursuant to such an application and to charge the costs of such study to the petitioner. If it is found that the conditions are or will be such that the water will be contaminated so as to endanger the lives and health of human beings or animals or constitute a menace to the public health, such petition shall be denied but time shall be given to enable the petitioner to investigate, design and construct a new or modified system or to correct the operation thereof. If it is found that the conditions are or will be such that injurious pollution will not take place, a revocable permit will be granted, such permit to be terminated whenever the conditions become unsatisfactory. The law further provides that parties discharging dangerous wastes into waters comprehended by the act, without having an unrevoked permit to do so, may be enjoined by any court of competent jurisdiction at the suit of any party injuriously affected or at the suit of the State Board of Health. Violations of the act are defined as a public nuisance dangerous to health and subject to summary abatement.

Amended Statutes of 1913. The statutes of 1911 applied only to inland fresh waters. The legislature of 1913 amended the laws above outlined so that they now apply not only to inland waters but to all salt waters as well.

Digest of Complete Legislation now Effective. Attached hereto (Appendix I) is an outline digest of that portion of the public health act of California which applies to the protection of the purity of the inland and salt waters of the state.

OPERATIONS OF THE STATE BOARD OF HEALTH UNDER THE LAWS.

Applications for Permits for Sewage Disposals. Under the law which became effective in 1911, twenty communities have made applications for permits for sewage disposal and have signed the blanks, which legally bind them to meet all expenses incurred by the State Board of Health in connection with the investigation and reporting thereon. In addition to these applications on the part of communities, other applications have been received for permits for the disposal of cannery wastes, hotel sewages, etc. Up to the present time most of the places making application have been visited and with respect to a number of these complete reports have been made and action has been or is being taken by the board.

The total number of applications from communities should, strictly speaking, since the law has now (effective August 10, 1913) been made to apply to salt waters as well as fresh, be equivalent to the entire number of communities having sewerage systems.* Very few communities have thus far shown any distinct antagonism to the provisions of the law and it is believed the great majority of them will, without any considerable pressure, place themselves under the law and apply for permits as the law requires.

* Except those which are remote from all water courses and dispose of their sewage by irrigation of land.

Certain communities will, doubtless, require to be forced into line through legal action undertaken by the state through the department of the attorney-general. The State Board of Health, in whose hands the enforcement of the law has been placed, has not as yet taken an aggressive stand which would have the effect of bringing in applications from all of the communities in the state having sewerage systems, for the reason that if applications were received in such numbers, the existing machinery would be entirely inadequate. The board is, therefore, cautiously entering upon its duty as an agent charged with the safeguarding of the purity of the inland waters and, generally speaking, is considering the more difficult and more serious problems first.

Attitude of Communities toward Stream Pollution. California communities located upon inland waters have, generally speaking, taken a remarkably satisfactory attitude toward stream pollution and many of them, without pressure from the outside, have voluntarily provided sewage treatment plants. It is true that certain of these plants have been extremely crude; they have been ill-designed and are being poorly operated. Nevertheless, communities in general have not shown any disposition to shirk their responsibilities and when the shortcomings of existing plants are demonstrated they seem to be willing to remedy the conditions by building new or modified works or by more painstaking operation. Without question a great deal of educational and missionary work must be undertaken by the State Board of Health through its various departments in order to rouse and direct public opinion in these matters. It is believed that the quality of municipal engineering works in this state has improved greatly during recent years. There is still room for a decided improvement, however.

Engineering Organization. The legislature of California has not provided the State Board of Health with regular funds by means of which an engineering organization can be built up. The present activities of the board are comprehended by the comparatively small amount of work which can be accomplished by the consulting engineer, assisted at times by other engineers temporarily engaged upon some specific problem.

Necessity for Annual Grants and a Revolving Fund. A reading of the law will show that two funds are necessary: one, an annual grant upon the basis of which a regular permanent engineering organization can be built up; the other, a revolving fund from which engineers engaged to investigate specific problems may be paid pending the receipt of fees and expense accounts as provided for by the law. It seems to be impossible to build up an engineering organization upon the basis of the fee system alone, because the payment of these fees by the communities involved is often delayed many months and in general the returns to be expected are so variable and indefinite as to represent an unsatisfactory source of income without such a fund as that suggested.

SUMMARY AND CONCLUSIONS.

Introduction. The state of California is the second largest in the United States, having a land area of approximately 155,650 square miles. The total population in 1910 was about 2,377,500 persons, representing an average density of only 15.3 persons per square mile of land area. As respects total population, California ranked as twelfth and, as respects average density, this state ranked as thirty-fifth among the forty-eight states of the United States. Forty-five per cent. of the entire population of the state was resident in eight cities, having a population of at least 25,000. Around San Francisco Bay, and adjacent to Los Angeles, there was a population of about 1,250,000 or more than 53 per cent. of the total population of the state. At the present time there are 231 incorporated cities and towns and three sanitary districts.

There are sixteen principal river systems and very many small streams, both tributary to these river systems and with independent outfalls. The state is mountainous in character. The year is divided into practically two seasons, a wet season extending from October to March, and a dry season extending from April to September. There is a great variation in rainfall in different parts of the state and on this account the yield of streams is a very variable quantity. Owing to the long dry seasons many of the streams, especially in the southern part of the state, are intermittent in character.

Sewerage and Sewage Disposal. From the information at hand, it appears that there are 165 incorporated communities and sanitary districts with more or less complete public sewerage systems, ten incorporated communities with private sewers serving a considerable portion of the population and sixty-four places where no sewerage systems have been constructed. Summarized information with respect to the sewerage and sewage disposal of the incorporated communities is presented in Table No. 1, page 822. In addition, there are at least five unincorporated places with public sewerage systems.

Stream Pollution. There is no stream of consequence in the state which is grossly polluted with sewage. There are a few cases where small communities on very small streams are discharging sewage and sewage effluents in a way which may produce nuisances of a local character during a portion of the year. Considering the state as a whole it may be said that the æsthetic and sanitary condition of streams is at present fairly satisfactory. The pollution of surface waters by trade wastes is very limited. The wastes worthy of consideration at the present time are those resulting from lumbering, mining, canning, tanning, paper making, beet sugar manufacture and oil refining.

Underground Water Pollution in California. Speaking generally, the underground waters in California have not become contaminated to any

considerable extent. One serious phase of the problem, however, is represented by the disposal of residential sewages in deep gravel strata through wells bored for the purpose. Otherwise the problem of ground water contamination in California is not different in character from that encountered elsewhere.

Pollution of Salt Waters. As yet very few nuisances, except possibly some of a very limited extent, have been produced by the discharge of sewage into bodies of salt water in and adjacent to the state. An important exception is the Los Angeles sewer outfall at Hyperion where serious nuisances are alleged by near-by beach resorts on account of shore pollution. Objectionable pollution of salt waters, with oil wastes, has obtained in certain bays along the coast, notably in San Francisco Bay. As a consequence, the oyster industry here has been disastrously affected.

Controlling Legislation. The crude laws controlling the purity of inland waters in existence prior to 1907 have gradually been amended and extended until, at the present time, so far as legal enactments are concerned, there are provided very efficient means of controlling the quality of the inland and salt waters of the state. A complete digest of the laws now in force is presented in Appendix I.

Operations of the State Board of Health under These Laws. Pursuant to the terms of the laws which became effective in 1911, twenty communities and several industrial corporations and hotels have made application for permits for sewage disposal. No effort has been made to compel all communities and other parties in the state to make such applications because the machinery for handling them would be entirely inadequate, but real progress is being made and, thus far, no serious obstacles have been encountered, nor has the law met with decided antagonism. Undoubtedly some legal pressure will require to be brought against certain communities in order to force them to comply with the provisions of the law. Large annual grants and a substantial revolving fund should be provided in order that the State Board of Health may properly carry out the provisions of these and other sanitary laws which have now been enacted and require enforcement.

Berkeley, Cal., September, 1913.

APPENDIX I.

DIGEST OF STATUTES RELATING TO SEWAGE DISPOSAL AND PROTECTION OF PURITY OF WATERS IN AND ADJACENT TO THE STATE OF CALIFORNIA.

These statutes being a part of the Public Health Act of California first passed and approved March 23, 1907.

Original act applying to inland fresh waters was approved March 23, 1907; amended and approved April 1, 1911; amended, extended to include all bodies of salt water and approved June 13, 1913.

The principal provisions of the statutes relating to sewage disposal are eighteen in number and are as follows:

Section 2. (Final amendment approved April 1, 1911.)

- (1) It shall be unlawful to discharge or deposit or cause to be discharged or deposited any wastes, offensive, injurious or dangerous to health, into any body of water used or intended to be used for human or animal consumption or for domestic purposes.

(a) Wastes are defined as {
 sewage
 garbage
 feculent matter
 offal
 refuse
 filth
 any animal, vegetable or mineral matter or substance
 offensive, injurious or dangerous to health

(b) Bodies of water are defined as {
 springs
 streams
 rivers
 lakes
 tributaries of above
 wells
 or other waters

- (2) It shall be unlawful to deposit or discharge such wastes upon lands or places adjoining such bodies of water so as to flow or be emptied or drained thereinto.

- (3) It shall be unlawful to erect (erect, construct, excavate or maintain) or cause to be erected any structure for the discharge of wastes offensive, injurious or dangerous to health, whereby such wastes may empty (empty, flow, seep, drain, condense) or otherwise pollute such bodies of water used or intended for human or animal consumption or for domestic purposes.

(a) Structures are defined as {
 privy
 vault
 cesspool
 sewer pipes or conduits
 other pipes or conduits

(b) Wastes are defined as {
 impure waters
 gas
 vapors
 oils
 acids
 tar
 other matter offensive, injurious or dangerous to health.

- (4) It shall be unlawful to erect or maintain any permanent or temporary dwelling (house, camp, tent) so near to such bodies of water as to cause wastes to corrupt or pollute such waters.

- (5) It shall be unlawful for the owner (owner, tenant, lessee or occupant) or agent thereof of any house-boat (or boat intended for or capable of being used as a residence, house, dwelling or habitation) to moor or to suffer such boat to be moored on any stream within two miles of any water works intake: provided, however, that during the process of transporting such boat it may, if necessary, be moored within this distance for a period not exceeding one day.

Section 3. (Final amendment approved June 13, 1913.)

- (6) Whenever any party shall desire to deposit or discharge, or continue to deposit or discharge, into any body of water or into or upon any place from which surface or subterranean waters may run or percolate into such body of water, the same being used or intended to be used for human or animal consumption or for domestic purposes, any wastes forbidden as above, he shall file with the State Board of Health a formal petition for permission so to do.

(a) Parties are defined as any	{	county
		city and county
		city
		town
		village
		district
		community
		institution
		person
		firm
		or corporation

(b) Wastes are defined as	{	sewage
		sewage effluent
		or other substance named above (Sect. 2, item 1.)

- (7) Whenever any party shall desire to deposit or discharge or continue to deposit or discharge any sewage (sewage, sewage effluent, trade wastes or other substances) offensive, injurious or dangerous to health in any salt water within the jurisdiction of the state, "which is or shall be a menace to public health," he shall file with the State Board of Health a formal petition for permission so to do.
- (8) Accompanying such petition shall be a complete and detailed plan, description and history of the existing or proposed works or system and purification plant, showing geographical location with relation to bodies of water. Results of physical and bacteriological analysis of the substance or substances so to be discharged or deposited shall be submitted.
- (9) Upon the receipt of such petition, a thorough investigation of the proposed or existing works, system and plant, and all appurtenant conditions and circumstances shall be made under the direction of the State Board of Health. Hearings may be had before the Board or an examiner appointed for the purpose.
- (10) All expenses of such investigations, including hearings (except the compensation of state officers participating therein) shall be paid as they accrue by the petitioner (who is legally and firmly bound by the terms of the petition).
- (11) The petition shall be denied if it is determined that the substances to be discharged will, under the conditions and circumstances which obtain, so pollute the water as to endanger the lives and health of human beings or animals or constitute a menace to the public health.
- (12) If the petition applies to works constructed and in operation prior to the passage of this act, a temporary and revocable permit authorizing the continuance of such discharge may be granted to enable petitioner to investigate, design and construct a new or modified system, or to correct the operation thereof, the effluent from which shall not cause dangerous (see No. 11 above) contamination.
- (13) If, under all the conditions and circumstances which obtain, it is determined that the substances to be discharged will not so contaminate any waters in question as to be dangerous, the petition shall be granted, such permit to be revocable at any time when the Board shall determine that dangerous pollution is being caused.

- (14) The provisions of all laws relating to the preservation and propagation of fish and game, the deposit of débris and the obstruction of navigation must be complied with.
- (15) The State Board of Health and its agents (inspectors) shall have the power, authority and permission to enter all places, for purposes of examination, to determine violations of the law.
- (16) Holders of permits may, at any time, by order of the Board, be required to furnish upon demand a complete report on the condition and operation of their works, such report to be made by a competent person designated for such purpose by said Board and at the cost and expense of the holder of the permit.
- (17) Parties discharging dangerous wastes into any waters comprehended by this act, without having an unrevoked permit so to do, may be enjoined by any court of competent jurisdiction at the suit of any party whose water supply is polluted or whose health shall be menaced by such discharge, or at the suit of the State Board of Health.
- (18) Violations of this act shall be deemed a public nuisance dangerous to health and may be summarily abated as such.

NOTE:—Complaints of pollution of a water supply may also be made and the situation investigated and corrected under the provisions of Chap. 373 Revised Statutes of 1913, State of California. The provisions of state laws relating to nuisances may also be invoked in connection with this act in certain cases.

STREAM SANITATION IN ILLINOIS.

PAUL HANSEN,

Engineer, Illinois State Water Survey.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

The most conspicuous case of stream pollution in Illinois is the well-known pollution of the Illinois River by the sewage of Chicago poured into it at Lockport through the Chicago Sanitary Drainage Canal. The number of people using the Chicago sewers is approximately two million three hundred thousand. To the domestic sewage from this population are added great quantities of industrial wastes from stock yards and manufacturing plants. The dilution afforded by the water diverted from Lake Michigan into the drainage canal through the Chicago River represents about three cubic feet per second per one thousand persons tributary to the sewers.

The conditions in the drainage canal proper are not especially foul, nor is the odor in the vicinity of the canal marked, owing to the fact that most of the organic matter is still in a fresh and undecomposed condition. An exception occurs to this in hot weather when ebullition takes place in the sludge deposits in the bottom of the canal and causes large quantities of this foul sludge to rise to the surface. These comparatively unobjectionable conditions persist until Lockport is reached, thirty-five miles below the mouth of the Chicago River at Chicago. Upon entering the lower Des Plaines River, the water and sewage from the canal is joined by the somewhat highly polluted water of the Upper Des Plaines. A change in the character of the water then takes place, due to the onset of putrefactive conditions. The liquid grows darker and disagreeable odors are more pronounced. The putrefactive processes continue and reach their culmination at some point between Morris, sixty-two miles below the mouth of the Chicago River, and the Marseilles dam, eighty miles below. The point of worst condition varies with the stream flow and the season of the year, generally being farthest up stream in the winter and farthest down stream in the summer. Within this distance, the water of the river is likely to have a characteristic grayish color and is totally devoid of all life except those organisms which flourish under putrefactive conditions. Most prominent among these are *sphaerotilus natans* and *carchesium lachmanni*. Below the Marseilles dam the water of the stream begins to recover from its sick condition and this recovery is, no doubt, given an impetus by the marked aeration that occurs as a result of the flow over the dam. A normal appearance, however, does not occur in the summer time until Hennepin is reached, one hundred and sixteen miles below the mouth of the

Chicago River. Here the grayish color has disappeared and is replaced in the summer time, at any rate, by a characteristic greenish hue indicative of the presence of chlorophyll-bearing organisms. Fish life is also found in quantities that make commercial fishing profitable, but many clean water loving species are not present as formerly and the fishing, in general, is not considered as good as in past years. Sludge deposits of sewage origin are found at Hennepin and these have a bad odor in the winter time, though in summer time due to the greater activity of the organisms of decomposition, the sludge has no disagreeable odor. At points below Hennepin, the river is entirely normal and the plankton content, hence the fish food, has been greatly increased since the opening up of the Chicago Drainage Canal. The assumption may fairly well be made, therefore, that the fishing in the lower Illinois River has been greatly improved by the discharge of the sewage of Chicago into the river.

By means of dissolved oxygen determinations, the pollution of the Illinois River may be traced all the way to the Mississippi and in this distance the recovery of dissolved oxygen does not amount to more than one third of the normal. This lack of dissolved oxygen is not sufficient to have any effect on fish life, nor is it any indication of an objectionable quality of the water at points below Hennepin.

Fortunately the Illinois River is at no point used as a source of public water supply and hence this factor does not enter into the case.

Studies on the biology of the Illinois River, under the direction of Prof. Stephen A. Forbes, director of the Illinois State Laboratory of Natural History, suggest most strongly the advantage of using a biological examination of stream water as a criterion for measuring the effect of stream pollution. This has the great advantage over ordinary analytical methods in that the biology of a given point on a stream is not subject to the sudden and marked fluctuations that characterize the chemical composition of the water.

Aside from the pollution of the Illinois River by the sewage of Chicago, there are only a few important cases of stream contamination. The next most important case is the pollution of Lake Michigan by a number of towns lying to the northward of Chicago. Most of these towns are residential in character, but the northernmost, namely, Waukegan with a population of about 18,000, has a number of wastes producing industries. The industrial wastes from Waukegan have in the past given rise to a distinct nuisance, but this has been largely corrected, though not entirely eliminated. The principal objection to pollution of the north shore of Lake Michigan is the contamination of public water supplies and the fouling of beaches. The protection of Lake Michigan against undue pollution along the north shore, together with the securing of pure water supplies for the north shore communities, are related problems that are now

demanding solution and it is not probable that an adequate and economical solution will be reached unless the various communities involved can arrive at some basis for coöperation.

The next most important case of pollution which is giving rise to agitation at the present time is the pollution of the Sangamon River by Decatur, a city having a population of about 37,000. Here the dilution at low water is practically nil at the point of sewage discharge. This is due to the fact that practically the entire stream flow is utilized for public water supply above the point of sewage discharge. Near Decatur the stream is very foul and these foul conditions during the summer time extend for a distance of six to twenty miles below the city, depending upon the stage of water. Farmers living along this stream are complaining of disagreeable odors and the fact that the stream is rendered unfit for cattle watering. The city is now preparing to treat the sewage. The situation at Decatur is complicated by the presence of industrial wastes from a large starch works. When the starch plant is in operation, the pollution extends for a considerably greater distance down stream.

The pollution of a small stream known as Cedar Creek flowing through Galesburg, a city with a population of 25,000, is now giving rise to considerable complaint. This stream has in the summer time practically no flow and is grossly contaminated. The complaint comes from farmers who object to the odors and the fact that the stream cannot be used for cattle watering.

At Bloomington, a town with a population of 28,000, a small stream known as Sugar Creek is grossly contaminated, but it is interesting to note that no serious complaint has as yet been made against this condition. As the stream rises a little to the north of Bloomington, it has no natural flow in the summer time and it becomes virtually an open sewer. The sewer outlets discharge at points remote from the better residence districts and in the vicinity of packing houses and rendering plants so that the stream is the least offensive object in its neighborhood. Beyond the city the stream passes through open country and there are practically no houses on or near its bank. The bed of the stream consists of a series of riffles and pools which promotes rapid self-purification of the stream. As a rule, even in summer time, foul conditions extend only a distance of about one and three-fourths mile below the town. In the winter time or when the stream has a considerable flow, the odors may be detected as many as six or eight miles in a down-stream direction. This apparent anomaly may best be explained on the grounds that during very dry weather practically all of the sewage flow soaks away into the earth and the clear water that appears at points lower down on the stream represents accessions of ground water. This phenomenon is quite characteristic of many small towns in Illinois and has been especially observable during the past unusually dry summer.

A striking example of this was observed in the little town of Mount Sterling where sewage was being discharged into a dry run at the rate of about one hundred thousand gallons per twenty-four hours. This sewage was a very foul and offensive liquid, but within one-half mile had entirely disappeared. Nothing was to be seen but a perfectly clean and very dry stream bed.

Springfield, with a population of about fifty-two thousand, discharges its sewage into several small streams at numerous outlets. These streams wind through more or less open country and after a flow of some miles discharge into the Sangamon River. The pollution of one of these small streams is very marked and has given rise to some local nuisance, but this nuisance is taken more or less as a matter of course and has never resulted in serious complaint. The Sangamon River shows practically no visible evidence of pollution below Springfield.

There are numerous other cases of stream pollution on small streams throughout the state, among which special mention may be made of the Upper Des Plaines River and many very small streams in the vicinity of Chicago. Nearly all of the more serious complaints in this class result from injury to property, by the creation of a nuisance. Efforts in a number of instances have been made to correct the objectionable conditions by the installation of small sewage treatment plants, but as a rule these treatment plants are imperfectly operated, often of faulty design or construction and give only partial relief.

STREAM POLLUTION IN INDIANA.

JAY A. CRAVEN, C. E.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

Stream pollution in Indiana, as in many other states, has only been given serious consideration in the last five or six years. Although we have a number of small creeks and ditches receiving domestic sewage and manufacturing wastes, there are but two large bodies of water in which serious conditions exist, one the southern end of Lake Michigan, due principally to the Calumet River, and the other, White River. The latter, which is the worse, flows diagonally across the state, receiving sewage from Winchester, Muncie, Anderson, Noblesville, Indianapolis, Martinsville and Washington.

In 1908 (see Indiana State Board of Health Report for 1908), the sewage pollution in the lake was traced for a distance of one mile from shore, endangering the water supply of South Chicago, Whiting, Hammond, Indiana Harbor and East Chicago, as the intakes at these different cities do not extend over three thousand feet from shore. At a distance of three miles from shore the average bacteria count was found to be over fifteen thousand and *B. Coli* were present in 23 per cent. of the samples.

The investigation, made in 1910, of the Calumet River showed that it was seriously polluted. In the report (Indiana State Board of Health Report for 1910) on the Sanitary Survey of this river it was stated that "from this canal (at East Chicago) to the junction of the little Calumet River with the Grand Calumet, the river closely resembles a septic tank in appearances and action, where the process of the decomposition of organic matter is continually taking place." This, as stated before, causes the larger part of the pollution of the southern end of Lake Michigan bordering Indiana, and was, therefore, not considered independently.

White River, during dry seasons, has but a small flow of water and it receives domestic sewage from an urban population of 285,000, 246,000 of which are concentrated at Indianapolis. Packing houses, strawboard works and other manufacturing concerns contribute immense quantities of waste. The mean flow of the river at Indianapolis, as estimated by the United States Geological Survey in 1905, was 777,000,000 gallons and this was ten times the minimum flow. The minimum flow for the year was, therefore, 119 cubic feet per second. This is equivalent to .48 cubic feet per second per 1,000 people sewerage in, considering the population of Indianapolis alone. This figure is 15 per cent. of the minimum (3.3 cubic feet per second per 1,000 inhabitants) allowed by the Chicago Sanitary District.

The condition of the river is best described in the report of Prof. R. L.

Sackett of Purdue University on the Sanitary Survey of White River which he made in 1907. "It is difficult to picture the condition of White River, in and below Indianapolis. A black deposit of oily, foul, animal and vegetable matter can be raised from the bed for miles. The weeds are coated with grease and with sewage plants. Flats are covered with blackening offal; driftwood collects dead hogs and other animal refuse where they putrify. The odor is distinct for forty miles down the river. Animals will not drink it. It cannot be used for the laundry or other domestic purposes when the cisterns and wells go dry."

One farmer living forty miles below Indianapolis and one half mile from the river said "that the odor was so strong on foggy mornings that his family cannot eat breakfast unless the doors are closed."

Under the McGinnis Act of 1909, relief from excessive pollution can be obtained when a stream is being used for public water supplies, if upon petitioning the State Board of Health, an investigation verifies the complaint.

In the case of White River, complaint was filed by the county commissioners against the city of Indianapolis and, as the river was not used by the petitioners for a public water supply, suit was to be brought against the city. Realizing the conditions, and rather than go into an expensive law suit, the city of Indianapolis coöperated with the State Board of Health and now has an experimental sewage disposal plant in operation in order to determine the requirements for a plant to take care of all the sewage of the city.

The last legislature passed what is known as the Thornton Act which concerns "the purity of water supplied to any city or town for domestic use." Under this act the burden falls upon the company or city controlling the water works to the extent, that any improvements necessary to produce a satisfactory supply, shall be made if the State Board of Health after an investigation so determines. To obtain an investigation, the board of health of any city or town, the county health officer, or citizens equal to 5 per cent. of the electors shall file a petition with the State Board of Health.

Under the Act of 1913, three cities have already filed petitions, and in the case of one, an order has already been issued to install a filter plant or change the source of supply.

No difficulties have been encountered in enforcing these acts because, although bad conditions do exist in the state as previously indicated, the work of correction has just been started. Sufficient legislation has not been passed, however, that would give the State Board of Health the authority to control the disposal of sewage and public water supplies, and such power should be invested in this body. It is hoped that the date is not far distant when this will be done.

PREVENTION OF RIVER POLLUTION IN KANSAS.

C. A. HASKINS,

Engineer in Charge, Kansas State Board of Health.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

The water and sewage law of Kansas, which is chapter 382 of the Laws of 1907, as amended by chapter 226 of the Laws of 1909, entitled "An act to preserve the purity of the waters of the state, for the protection of the public health, prescribing the duties of the State Board of Health in relation thereto, and providing penalties for the violation of the provisions herewith, and to provide for the naming of an engineer for the State Board of Health," among other things prohibits sewage from being discharged into any of the waters of the state without a permit from the State Board of Health, approved by the governor and the attorney-general. This permit may stipulate the conditions under which sewage may be discharged into the waters of the state and is issued for a period of not more than two years.

If at any time complaint be made to the State Board of Health by the proper health authorities of the city or county that the discharge of sewage into waters of the state is polluting such, to the detriment of public health, investigation shall be made by the board; and, if it be found that such water is being polluted in a manner dangerous to the public health, an order may be issued stating the conditions under which the discharge of sewage may continue. This order may be appealed from to the district court of the county in which the pollution occurs, and the court may modify or set aside the order. It is also provided that investigations may be made by the State Board of Health, upon its own initiative. Thus the protection of public health through the prevention of pollution of rivers and streams in Kansas, while intended to be delegated to the State Board of Health, really is dependent upon the action of the governor and attorney-general and, ultimately, upon the district court of the county in which the pollution occurs.

Sewage is defined, for the purposes of this act, as "any substance that contains the waste products or excrementations or other discharges from the bodies of human beings or animals, or chemical or other wastes from domestic, manufacturing or other forms of industry." Thus trade wastes, oil wastes from wells, refineries, asphalt plants, mine wastes and creamery wastes, in addition to domestic sewage, are to be listed under the control of the State Board of Health, and their treatment has been studied and undertaken under advice or orders from the State Board of Health. Several orders have been issued for the treatment of oil wastes, and no little protection from nuisance has been accomplished in the oil fields of the state. Creamery waste disposal has an important part to play also in the development of the milk industry of Kansas, and studies are being made now of two or more modes of disposal of this extremely troublesome form of waste.

Naturally, the protection of those streams which are used for water supplies is what is most desired; but from the fact that many of our cities are small and do not require large quantities of water, local ground water constitutes the supply of most plants. Also, under one large portion of the state is the inexhaustible underflow of the Arkansas River; under another portion is a relatively soft supply of semi-artesian water; while under still another portion is a supply of sulphur-impregnated water, from deep wells, which may be easily aerated, furnishing a relatively soft and palatable supply. Of the 190 water supplies of the state, only about forty depend upon surface water and about twelve of these are impounded storm water supplies. Since the water and sewage law delegates authority to the State Board of Health to prescribe the manner of treatment of water supplies, a definite policy of filtration for surface water supplies has been adopted, and this is depended upon for the protection of such supplies rather than sewage treatment; but no raw sewage is permitted to flow into any streams used for water supplies. Treatment usually consists of septic or Imhoff tanks followed by contact filters.

The greater number of sewer systems are provided with disposal plants, usually, however, to prevent local nuisances. These plants consist of septic or Imhoff tanks, followed by dilution or by contact filters, depending upon the ordinary minimum stream flow. While there are no hard and fast rules controlling the amount of diluting waters, about 5 c. f., s. per 1,000 persons contributing sewage, based on a sewage flow of 100 gallons per capita daily, is desired. It is considered that a 50 per cent. saturation of dissolved oxygen is sufficient, and that no considerable amount of organic matter should be visible in the neighborhood of the sewer outlet. Often, however, these limits are reached or exceeded, particularly in such periods of drouth as is now being experienced.

Very few orders for the treatment of sewage have been issued as, ordinarily, cities are anxious and willing, when the matter is brought up squarely before them, to do what is necessary for the protection of the public health. A campaign of education brings about better results than orders or threats. One city, however, has refused to comply with orders issued for the proper disposal of its sewage for the protection of a filtered water supply some fifteen miles down stream from it; the time limit mentioned in the order is up, and the attorney-general is preparing a case, and we are anxiously awaiting the result, to find out whether or not the water and sewage law of Kansas will be upheld in court.

It should be remarked that we are also troubled by the lack of jurisdiction, federal or state, over pollution of interstate rivers such as the Missouri. Three of our most important cities are dependent on this river for water supply—Atchison, Leavenworth and Kansas City, Kans., as well as the cities of Omaha, Nebraska; St. Joseph, Missouri, and Kansas City, Mo.; and these cities also all use the river for the disposal by dilution of their sewage. Sure'y federal legislation to cover such streams is highly important and should be urged with all the intelligence and force available.

STREAM POLLUTION IN LOUISIANA.

J. H. O'NEILL,
State Sanitary Engineer.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

Louisiana has an area of 45,409 square miles and a population, according to the census of 1910, of 1,656,388. As the chief industries of Louisiana are agricultural, the population is scattered and the state has not yet been forced by intensity of population to consider seriously the problem of sewage purification.

There are only six cities in the state with a population over 10,000. All these are provided with sewerage systems. Five are situated on large rivers and, as there are no cities below using the river water for potable purposes, the sewage is discharged directly into the river without treatment.

Lake Charles, population 11,449, has recently installed a sewerage system which discharges through four outfalls into Lake Charles and Calcasieu River. As the flow of the river is at times rather sluggish, septic tanks are provided to remove the solid constituents of the sewage.

Of the cities of less than 10,000, only one, Opelousas, population 4,623, has a complete sewerage system. The sewage is treated in a plant consisting of a grit chamber, Imhoff tanks and percolating beds. The effluent is discharged into a small drainage canal. The plant has been in operation only a few months and as yet no data as to its efficiency are available.

One problem peculiar to the South, and more particularly to the southern part of Louisiana, is the pollution of small streams by the wastes from sugar refineries. The broad fertile alluvial plains of the southern part of the state are given largely to the raising of sugar cane. These plains are cut up by a network of shallow sluggish streams called bayous. These bayous serve as highways for much water traffic. Along their banks are located many sugar refineries and plantation colonies, the wastes from which are discharged into the bayous.

During 1910 and 1911 an investigation was made of Bayou Teche, one of the most important of these streams, by a committee headed by Dr. Beverly W. Smith, vice-president of the Louisiana State Board of Health, and composed of ten physicians, three parish health officers, three city health officers and two sanitarians—the chief of the state engineers, the United States army engineer in charge of the gulf district, three planters, and the state analyst. Out of this committee, a sub-committee consisting of two engineers, one planter, two physicians, and one chemist, was appointed. This sub-committee was appointed to oversee the general work done in the field and laboratory.

Three trips were made from the mouth of the Teche to Morbihan and a

final trip was made in 1911 as far as St. Martinsville. Field surveys and analyses were made; samples were collected and complete analyses were made in the laboratory.

The Teche is a long, narrow, winding stream with a sluggish current. During the grinding season it is practically stagnant. The average width of the watershed is about 2,000 feet and varies from very steep banks to very gradual slopes.

The sources of pollution are as follows:

1. *Wastes from the population along its banks.* There are ten towns on the bayou varying in population from 300 to 9,000, and many farms between these, making a total population of 27,000 whose discharge might get into the bayou. None of the towns has a general sewerage system, but all have a few private sewer lines. The open-back surface toilet is common in this section and rains wash much pollution from the closets into the bayou.

In addition there is also a considerable amount of pollution from vast numbers of mules, horses, pigs, sheep, dogs, poultry, etc., from the farms and stable-lots on the banks of the bayou.

2. *Sugar refinery wastes.* There are twenty large sugar refineries along the bayou, with a total capacity of one hundred million pounds per season. The bayou water is used for cooling the evaporating pans and, there being little current to carry it off, it goes back and forth from the mill to the stream in a constant circle until it has lost much of its oxygen by being heated, and so is deprived of its purifying powers.

The "sweet water," that is, the condensed vapors from the evaporating pans is also discharged into the bayou. It is estimated that about 3,000 pounds of sugar out of every million pounds manufactured are lost in the sweet waters through entrainment, sugar being only one of the decomposable substances carried over in this manner. Estimating the sugar production of the Teche proper at one hundred and fifty million pounds, we have four hundred and fifty thousand pounds of sugar polluting the Teche each season.

Sanitary surveys and analyses show that even at its best, namely during high water, the Teche is taxed to its capacity for caring for organic wastes from the first two sources at all times of the year.

Therefore, when the additional burden of the refinery wastes is put on the natural purification processes they prove to be utterly inadequate. The stream is almost wholly deprived of its dissolved oxygen, the fish are killed and the noxious odors of decomposition become almost unbearable in some sections.

The remedies proposed were:

First, to prevent pollution of the stream by all animal matter at all times of the year by proper sanitary observances.

To protect the stream from all possible sugar-house wastes and material containing organic matter.

Second, to turn into Bayou Teche, a large volume of fresh water, in order to maintain a constant current and prevent the sluggish condition of the stream.

Plans have been made by the United States and the state engineers for the joining of Bayou Courtableau to Bayou Teche, which would insure a constant current in the Teche, but the execution of these plans has been so far held up by the opposition of powerful irrigation interests.

Much good, however, has been accomplished by the general cleaning of the banks of the Teche and by the discharge of organic wastes over the crest of the ridges on both sides of the Teche.

STREAM SANITATION IN MAINE.

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Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

There is but one sewage disposal plant in the state. That one is located on the National Reservation, at Togus. It consists of a couple of small sprinkling filters, and was installed to rid the small brook, into which the sewage from the home was discharged, of a nuisance. The plant, when properly attended to, gives very satisfactory results; but, unfortunately, it does not receive such attention at all times.

The polluting wastes in our rivers and streams at the present time are sulphite pulp wastes, and domestic sewage wastes. Formerly sawmill waste, especially sawdust, entered our rivers in large amount; but there is now a statute law prohibiting the entrance of such waste into any of the streams of the state.

None of our rivers are in a state that would be called a nuisance. The large size of the rivers, their comparatively even flow, as they head in the wild lands, and the relatively small amount of trade waste that enters them has resulted in a normal appearing river, even within four miles of our largest pulp mills.

Domestic sewage has, however, unfitted all of our rivers for drinking use, unless the water is first filtered. Owing to the abundant supply of ground water in the state, and the great number of lakes and ponds, we always raise objections to the use of a river or stream as a source of public water supply in this state.

Our six large rivers, flowing south, are all unfit for drinking, owing to this pollution. The Saco becomes polluted twenty miles from the sea; the Presumpscot, fifteen miles from the sea; the Androscoggin is polluted throughout its entire length in this state, receiving its initial dose across the New Hampshire line; the Kennebec is polluted 100 miles from the sea; the Penobscot, 150 miles inland; and the St. Croix, about twenty miles from the sea. Of the rivers flowing north all are in the wild lands, save the lower reaches of the Aroostook, which is polluted below Ashland, about sixty miles from its junction with the St. John.

All of our rivers are in good physical condition, and can take care of many times the volume of sewage they are now receiving without becoming a nuisance. The present amount of trade and domestic sewage waste has hardly touched their oxygen content. Our entire trouble is with domestic wastes.

STATE CONTROL OVER WATER SUPPLY AND DRAINAGE CONDITIONS IN MARYLAND.

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Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

NEED OF CONTROL IN MARYLAND.

The desirability of legislation, giving a State Board of Health broad supervisory powers and duties in connection with the regulation of water supply service and stream pollution, is perhaps universally recognized and the reasons for it are generally understood. Therefore, only those conditions will be mentioned here which tend to make central control more essential in Maryland than in many states at the present time. The most apparent of these are:

1. The scarcity of proper and adequate water supply and sewerage systems.
2. Lack of local government in vicinity of Baltimore and Washington.
3. Prevalence of typhoid fever.

Water supply and sewerage facilities in Maryland are unsatisfactory in the extreme. While practically all communities of any considerable size are supplied with public water systems, many of these seem to have been constructed with almost the single objective of cheapness in view, and many are at present delivering unsafe water. Purification works are rare, and properly operated ones rarer still. Wells have been driven in thickly settled localities, and improperly protected surface supplies are generally used without treatment. In many of the towns supplied with water, private wells are still in more or less general use; and this is the case even in some places which maintain public supplies of good quality.

Many towns have a few sewers, and some have what may be called partial systems, but few are completely sewered. It is well known that Baltimore had, until recently, no sewerage system worthy of the name, and this system cannot be completed in all parts of the city for a year or two to come. Inadequate as are the means for collecting the wastes, provisions for their treatment are still more so. Sewage is discharged, in most cases, without reference to resulting dangerous and offensive conditions. As a consequence, many streams in the more populous districts, and several harbors, are foully polluted. It is only fair to say, however, that a few communities have recently built satisfactory sewage treatment works.

That Maryland is so poorly served with water supply and sewerage facilities is partly due to apathy and a lack of realization of the needs of modern life on the part of many inhabitants, and partly to the lack of money; but the greatest factor is the short-sighted policy of municipal officials, who think they are keeping down expenses on public works by dispensing with the services of an engineer, or by engaging an engineer of inferior qualifications, with the resulting establishment of improperly protected or uneconomically operated water supplies, and poorly designed sewerage systems which are uneconomical in construction, unsatisfactory in maintenance and operation, and which create dangerous or offensive conditions in the bodies of water into which they discharge.

The second point mentioned as making state supervision over all water supply and sewerage questions in Maryland especially essential is the curious fact that in the neighborhood of Baltimore there are no incorporated communities, and that in the vicinity of Washington much of the territory is also under county government only. Baltimore County,* with a population of nearly 140,000, almost entirely surrounds Baltimore City. From 1900 to 1910, its population increased at a rate of about 35 per cent. A very large proportion of the total population resides within a few miles of the city boundary. Practically all of the territory in the county outside of the suburban zone decreased in population between 1900 and 1910, and, therefore, it is evident that the territory just outside of Baltimore City is growing at an exceedingly rapid rate. The county is governed by three commissioners. Taxes are levied on the county as a whole, and improvements in the various localities are hard to obtain. Very little money has been spent for sewer construction, and large areas have become densely populated, with no provision whatever made for the collection and disposal of sewage. This neglect has resulted in deplorable sanitary conditions at many points, some of which are due to inadequate systems of sewers built by real estate developers, and others to the entire absence of sewers.

Conditions around Washington are somewhat similar to those near Baltimore, but are in general not quite so critical, as the population is not so large and the incorporated parts of the territory are not entirely dependent upon county government for the institution of public works.

The third reason mentioned for strict state control over water and sewerage questions in Maryland is the unenviable position which the state holds in respect to the prevalence of typhoid fever. Mortality from this disease is from twice to four times as great as in other eastern states, such as New York and New Jersey, and the New England States. And it is a fact that Maryland has had almost the highest mortality from typhoid fever in the whole registration area of the United States, ever since 1906,

*Baltimore City is not a part of Baltimore County.

the year that the state became a portion of that area. Moreover, in strong contrast with almost all the other registration states, there was no substantial decrease in the typhoid fever death-rate between 1906 and 1911; and the rate in Maryland was practically constant for at least twenty years previous to 1911.

In this state there are many more cases of typhoid fever than of any other communicable disease reported, except tuberculosis and measles, and during some years even these are exceeded by a considerable margin. It is also true that, with the exception of tuberculosis, typhoid fever is the direct cause of many more deaths every year in Maryland than any other communicable disease.

EXISTING LAWS.

The need for controlling water supplies and stream pollution in Maryland became so well recognized by the year 1910 that a law was enacted creating, among other special divisions of the State Board of Health, a bureau of sanitary engineering. The appropriation allowed was so small, however, that it was impossible to organize this bureau until May, 1912, just prior to which time a larger appropriation had been granted.

At the time the law prescribing the duties of the bureau of sanitary engineering was prepared, it was feared that strict measures for the control of water supply and sewerage service would fail of passage, and it was, therefore, deemed wise to provide at first for investigation and study, rather than regulation, of conditions. The duties of the bureau may be briefly summarized as follows: the examination of, and the recording of plans relating to, all public and private systems of water supply and sewerage in the state; reporting upon the sanitation of public buildings; investigating offensive trades and nuisances, the disposal of trades wastes and sewage; and devising means for the improvement of unsanitary conditions. There is nothing in the law creating the bureau which gives it power to do more than recommend. Whatever, then, is done in Maryland towards the regulation of water supply and sewerage service must be accomplished under old legislation; and there are very few specific provisions under which the State Board of Health can act. It is natural that early legislation should deal almost wholly with the control of disease, epidemics and nuisances after they existed, rather than to prescribe measures which would tend to prevent their occurrence.

Under existing conditions, the bureau of sanitary engineering is called upon for advice in many cases involving new water and sewerage systems or improvements in old ones, and often its recommendations are followed, but the submission of plans for approval is optional, except in the case of the establishment of sewerage systems by the county commissioners of Baltimore County; and there seems to be nothing to prevent the utilization of any source of water supply whatsoever, nor to give the state power

to interfere with the construction of any form of plant. Until the harm is done, the State Board of Health has no jurisdiction.

If a water supply is found to be polluted, or if a body of water is in such an offensive state as to create a nuisance, the State Board of Health can take action, causing the condition to be remedied. The laws under which this is possible are briefly as follows:

1. A law prohibiting the pollution of any source of water or ice supply used for drinking or domestic purposes, by allowing sewage, trades-wastes, or any filthy animal or vegetable matter to reach it.

2. A law prohibiting the discharge of earth, ashes, filth, etc., from any boat, into any river, tidal creek, harbor or the northern portion of Chesapeake Bay.

3. A law empowering the State Board of Health to order the abatement of nuisances, or conditions dangerous to health, that may occur in or about any water-course, well, cesspool, ditch, drain, etc., and to order the execution of such works as may be necessary to accomplish this purpose.

Penalties are provided for refusal to comply with the provisions of these acts, and enforcement is possible through the circuit courts of the several counties and of the city of Baltimore.

It may seem as if there were sufficient law to keep water supplies and streams in Maryland in good condition, but it is plain that practically all improvement must come through enforcement of the nuisance law. It is through this channel almost entirely that owners of polluted water supplies can be forced to deliver pure water, for it is seldom that sufficient improvement can be effected by taking action, under the water supply law, against all contributors of polluting matter. It is high time that the State Board of Health be given, by legislation in specific terms, strict supervisory powers and duties, which will insure the construction of water and sewerage systems of a proper character, and not merely allow the correction of flagrant abuses.

ENFORCEMENT OF EXISTING LAWS.

Even with the laws at present existing, it would appear as though water supply and sewerage conditions in Maryland ought to be much better than they are, but it must be remembered that until about a year ago there was no engineering department in the State Board of Health and very little money was available for carrying on work necessary to such an end. Petty nuisances had been abated by local health authorities, and complaints regarding offensive conditions had been investigated by the State Board of Health, but no systematic investigation of water supplies and stream pollution could be undertaken.

Since the establishment of the bureau of sanitary engineering, the work

of examining all water supplies, sewage disposal works and stream pollutions has been started and is being carried along as systematically and rapidly as special investigations of various natures and a small appropriation will allow. Whenever improper conditions are found, adequate improvements are proposed by the bureau. If the recommendations are not followed, or equally effective changes made, an order embodying specified requirements is served, and a reasonable time is allowed for compliance. This method of handling such situations is of recent origin, and since its institution a considerable degree of success has attended its operation. As yet it has been unnecessary to appeal to the courts.

A consideration of the enforcement of sanitary legislation in Maryland brings to attention a court case which is of importance and interest, not only as upholding the supremacy of the law, but on account of the boldness with which public officials sought to disregard the law, spend the public funds and defy public opinion, the amount of money involved, the length of the case, and the volume of expert testimony taken.

In the summer of 1912, a sewage disposal plant of a patented type, together with tributary sewers, was completed by a private company near Mount Washington, a settlement in Baltimore County, about one and one-half miles north of Baltimore City and in the valley of Jones Falls. These sewers have a total length of slightly less than ten miles and serve, at present, part of the settled territory in the valley of Western Run, a stream tributary to Jones Falls, having a drainage area of about four thousand acres.

In September, it became known that the use of the Mount Washington disposal works was being considered by the county commissioners as the nucleus of a public sewerage system for the Jones Falls valley. Accordingly, the advisability of such action was investigated by the bureau of sanitary engineering. This resulted in a report to the State Board of Health by the writer, in which it was stated that the use of this plant would be unwise, since the sewerage problem in that locality had received insufficient study, and also since the plant was privately owned, improperly located for the purpose for which it was wanted, of an untried type, of faulty design, had been unnecessarily expensive in construction and would be so in operation, that patent litigation was to be feared, and that it was merely a clarification plant and would be incapable of furnishing an effluent of proper quality for discharge, in large quantities, into Jones Falls. Just as this report was completed, it became publicly known that the commissioners were considering the purchase of the plant and sewers for the sum of \$600,000. The writer protested immediately against such a transaction, stating that main trunk sewers and a disposal plant for the whole Jones Falls drainage area would cost only about \$250,000 and that the \$600,000 would be practically wasted.

In Baltimore County, and in no other part of Maryland, there is a law, passed in 1912, providing that no sewerage system shall be established by the county commissioners except in accordance with plans approved by the State Board of Health. Notwithstanding this, the state's protest was given no consideration by the board of commissioners and was, in fact, kept secret from one member. A former chief engineer of the Maryland State Roads Commission was engaged to advise the commissioners concerning the purchase. About a week after his employment, this engineer submitted a report valuing the property at the suggested purchase price. He estimated the cost of plant and sewers at \$300,000, while the remaining value was made up, in his judgment, of entrance contracts, patent rights, stream control, etc., factors which were, in reality, almost worthless to the public. In spite of the State Board of Health's protest, and in apparently reckless disregard for the law, the county commissioners purchased the property on the very day the report of their engineer was submitted, without even giving a public hearing on the question.

The haste and secrecy with which the deal was closed, together with the seemingly exorbitant price and failure to receive the approval of the State Board of Health, so aroused public sentiment that a number of citizens instituted proceedings in the circuit court of the county, against the commissioners and the sewerage company, to have the sale set aside, alleging fraud, unfair price and lack of approval by the State Board of Health. This board also asked the court to annul the sale, for the last-named reason. The state's case was held in abeyance, pending a decision on that of the taxpayers.

A detailed examination of the system was made by the force of the bureau of sanitary engineering. The plant was found to possess defects in design which would render it of little value when the sewage flow became normal in volume. The sewers were found to be poorly designed and built. It was estimated that the cost of constructing the entire work was \$82,000. This system, together with rights of way and several acres of land, was, in effect, what the public was to get for \$600,000.

The trial of the case occupied forty-five court days. Much technical testimony was introduced on both sides. The decision of the court was to the effect that the county commissioners had no power to purchase the system without the approval of the State Board of Health, and that the sale was therefore void. It did not deal in detail with the other points at issue. The case was not appealed and the matter is therefore at an end for the present at least. The testimony and the final decision fully justified the position maintained by the State Board of Health, and it is to be hoped that the trial of the case will mean much for better sanitation in Maryland, as it has brought forcibly before the people the need for strict state control over matters affecting the public health.

LAWS RELATING TO THE PREVENTION OF RIVER POLLUTION IN MASSACHUSETTS.

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Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs,
September, 1913.

In response to requests from members of the Association, I present herewith a brief description of the legislation of the state of Massachusetts relating to the prevention of the pollution of streams, the authority of the State Board of Health under existing laws and a general statement of the results accomplished in the enforcement of these laws.

In the consideration of these questions, it is of course not intended to discuss the question of the pollution of streams so far as it may affect their use as sources of domestic water supply. The use of unpurified river waters for domestic water supply in Massachusetts was discontinued long ago in accordance with recommendations of the State Board of Health, and in only one or two instances are river waters used for domestic purposes in Massachusetts, even after purification. The question considered herein is the problem of the prevention of the pollution of streams from the point of view of the health and comfort of those dwelling along their banks or in their neighborhood.

HISTORY.

Interest in the question of stream pollution in Massachusetts was very probably first aroused by the agitation of this question in England, and the first studies of the general condition of Massachusetts streams were made by the State Board of Health in the early 70's. Apparently the first legislation of importance relative to a study of the question of the condition of streams was enacted by the General Court in 1875. The important portions of this act are as follows:

. . . The state board of health shall investigate by themselves or by agents appointed by them, the subject of the correct method of drainage and sewerage of the cities and towns of the Commonwealth, especially with regard to the pollution of rivers, estuaries and ponds by such drainage or sewerage, and to devise and report a system or method by which said cities or towns may be properly drained, and said rivers, estuaries and ponds may be protected against pollution, so far as possible, all with the view to the preservation of the health of the inhabitants of this Commonwealth, and the securing to the several cities and towns thereof a proper system of drainage and sewerage, without injury to the rights and health of others; also, to report how far said sewage may be utilized and disposed of . . . (Section 1, Chapter 192).

In its report, published in 1876, upon the question committed to it by the above legislation, the board finds that no control over the streams was exercised at that time by anyone, all of the waters being left to the ordinary rules of common law.

The following is an extract from the conclusions expressed in this report concerning the matter of stream pollution:

. . . Any defence of their waters against impurities which so conveniently flow into them from the settlements and works on their banks has thus far been merely nominal; that is, the law can be used to prevent a nuisance from continuing to be poured into the river, but it is not used because the process is too slow, cumbersome and expensive. . . .

As a result of the investigation, the board made certain recommendations, of which the following are the more important:

1. That no city or town shall be allowed to discharge sewage into any water course or pond without first purifying it according to the best process at present known and which consists in irrigation, provided that this regulation does not apply to the discharge of sewers already built—unless water supplies be thereby polluted; provided also that such intended discharge can be shown to be at such point or points that no annoyance will arise from it.

2. That no sewage of any kind, whether purified or not, be allowed to enter any pond or stream used for domestic purposes.

5. That steps should be taken by special legislation based upon investigations and recommendations of experts to meet cases of serious annoyance arising from defective arrangements for the disposal of sewage.

6. That irrigation be conducted at first experimentally at those places where some process of purification of sewage is necessary and that cities and towns be authorized by law to take such lands as may be necessary for that purpose.

Finally, the Board feel that in the present state of our knowledge, sweeping laws for the general and immediate purification of all of our streams would be hardly justifiable and that they are not called for by the present condition of our rivers.

Following the report of 1876, the question of the prevention of the pollution of certain rivers rapidly became a most pressing one and special reports upon the Blackstone River and investigations of other streams were made from time to time until 1884. In the latter year a statute was enacted creating a special commission, afterward known as the Massachusetts Drainage Commission, to consider and report upon a general system of drainage for the relief of the valleys of the Mystic, Blackstone and Charles Rivers and for the protection of public water supplies within the basins of said rivers. This commission was also directed to consider the various methods of sewage disposal and the application of such methods in preventing pollution of the streams of these valleys, etc.

The commission considered the subject very thoroughly and in 1886 made a comprehensive report upon the whole question of the control of inland waters and the prevention of the pollution of streams.

This commission recommended the appointment of a board to have general oversight and care of the inland waters of the State, with power to

advise cities, towns, manufacturers and others as to the disposal of their sewage and wastes with the view of the protection of the public interest. Concerning the duties and powers of the proposed board, the commission advised in part as follows:

Let these guardians of inland waters be charged to acquaint themselves with the actual condition of all waters within the state as respects their pollution or purity, and to inform themselves particularly as to the relation which that condition bears to the health and well-being of any part of the people of the commonwealth. Let them do away, as far as possible, with all remediable pollution, and use every means in their power to prevent further vitiation. Let them make it their business to advise and assist cities or towns desiring a supply of water or a system of sewerage. They shall put themselves at the disposal of manufacturers and others using rivers, streams or ponds, or in any way misusing them, to suggest the best means of minimizing the amount of dirt in their effluent, and to experiment on methods of reducing or avoiding pollution. They shall warn the persistent violator of all reasonable regulation in the management of water, of the consequences of his acts. In a word, it shall be their especial function to guard the public interest and the public health in its relation with water, whether pure or defiled with the ultimate hope, which must never be abandoned, that sooner or later ways may be found to redeem and preserve all the waters of the state. We propose to clothe the board with no other power than the power to examine, advise and report, except in cases of violation of the statutes. Such cases, if persisted in after notice, are to be referred to the attorney general for action. Other than this, its decisions must look for their sanction to their own intrinsic sense and soundness. Its last protest against wilful and obstinate defilement will be to the general court. To that tribunal it shall report all the facts, leaving to its supreme discretion the final disposition of such offenders. If such a board be able to commend itself by its conduct to the approval of the great court of public opinion, it will have no difficulty, we think, in materially reducing the disorders and abuses which are threatening to give great trouble in the future if not speedily checked. If, however, we err in this expectation, and more drastic measures prove indispensable, the mandate of the state can always be invoked to reënforce its advice.

The Legislature of 1886, acting on the advice of the Massachusetts Drainage Commission, passed a law embodying the conclusions of that commission and committed its enforcement to the State Board of Health. Two years later, the law was amended by providing that all petitions to the legislature for authority to introduce systems of water supply, drainage or sewerage should be accompanied by the advice and recommendation of the State Board of Health thereon. Most important among the provisions of this law was the authority to conduct experiments upon the purification of sewage and manufacturing waste.

It was thus made practicable for the board through its own investigations and experiments to obtain reliable information as to the applicability of methods of water and sewage purification to the conditions found in Massachusetts and to give definite and practical advice as to the best methods available for solving the problems presented. With the continued operation of the experiment station, which has been maintained since this law was first put into operation, it has been practicable to study thoroughly all questions relating to the purification of water, sewage and manufacturing waste and develop new methods, and frequently to anticipate new prob-

lems requiring special methods of treatment. The board was thus enabled to advise with authority as to practicable and available methods for the purification of the sewage and waste by which the streams were becoming defiled and, taken in connection with the results of studies of the effect of the discharge of sewage and manufacturing waste upon streams under various conditions, it was possible to regulate their use as places of sewage disposal with due regard to the public health and the interests of all concerned in the condition of the rivers of the State.

The effect of this law was to provide that no sewage should be disposed of in the future from any city, town, or village, until the plans of the system and method of disposal had been passed upon by the State Board of Health. There was no penalty for failure to follow the advice and recommendations of the board, and in the earlier years works were built in one or two cases which did not conform to the board's recommendations; but since the legislature, very soon after the passage of the law, began the practice of inserting in practically all special acts relating to sewerage a proviso requiring the approval of the plans by the State Board of Health, the recommendations of the board came to be more closely followed.

The law of 1886, as subsequently amended in 1888, was supplemented in 1902 to the extent of requiring an annual examination and report to the legislature by the State Board of Health on the condition of all main outlets of sewage and drainage in the cities and towns of the Commonwealth and the effect of sewage disposal.

In later years, as a result of the examination of sewer outlets under this law, it was found that sewage disposal works in some cases were not operating satisfactorily, either from lack of sufficient capacity or of proper care, or on account of the introduction of matters into the sewers which interfered with the operation of the disposal works, and in response to recommendations, authority was granted by a statute of 1909 to regulate the character of waste liquors discharging into the sewers of cities and towns having disposal works and to require the enlargement or efficient maintenance of such works where such improvements might be necessary.

The general legislation relative to the prevention of the pollution of streams in Massachusetts is comprised substantially in the laws thus far mentioned. These laws do not apply to the Connecticut River—the largest stream in the state—and were not applicable to the Merrimack River until a law was passed in 1909 amending the statutes relative to the prevention of the pollution of streams as to make them apply in the case of the Merrimack River so far as the discharge of sewage into this stream was concerned. Each of these rivers receives considerable sewage pollution before entering the state, and this fact was, doubtless, of influence in causing them to be excepted from the provisions of law applied to other rivers.

RESULTS ACCOMPLISHED UNDER THE GENERAL LAWS RELATING TO THE PREVENTION OF THE POLLUTION OF STREAMS.

At the time of the passage of the act of 1886, as nearly as can now be determined, sewerage systems had been provided in twenty-eight cities and towns, which served large sections of the more populous areas in those municipalities. There were also partial systems of sewers in many other cities and towns. In most of the older and larger municipalities drains had been constructed at an early time for the removal of surface water and ground drainage and came later to be used for the removal of sink drainage and other sewage. These drains have been superseded and their use discontinued where modern systems of sewers have been introduced, but such drains are used even at the present day in many of the smaller towns and villages. In the earlier times they were usually constructed of wood or stone, but more recently earthen pipe has usually been employed. They are built in most cases by private parties, often without manholes, and it is usually impracticable to find a record of the location of the sewer or the number of connections therewith.

The modern sewerage system was first introduced from England, having been copied largely from the sewers of London, where both sewage and rain water were being removed in the same channels, but when adapted to a region like New England with a much higher rainfall, it often happened that very large sewers were required to convey the sewage to a proper outlet, whereas for the disposal of surface water and ground drainage alone, shorter and consequently smaller channels would have been adequate and satisfactory.

These conditions led to the development of the separate system of sewerage, the advantages of which had become evident to sanitary and hydraulic engineers by the time the first laws relating to the prevention of the pollution of streams were enacted in Massachusetts, but these advantages were not so obvious to the members of municipal governments, and in some places it was many years before city and town governments generally could be convinced of the disadvantages of the continued extension of combined systems of sewers, especially in those places where the treatment or purification of the sewage was likely to become necessary. In consequence, combined systems of sewers are still the rule in the cities and large towns in Massachusetts, but are not found in smaller places where systems have been introduced in more recent years.

When combined systems are in use, it is usually impracticable, when purification becomes necessary, to deal with the entire quantity of sewage and storm water discharged from the sewers in many of the cities and towns in the State, since the complete prevention of the discharge of sewage into a stream in such cases requires either the reconstruction of practically the

entire sewerage system in order to reduce within practical limits the quantity of sewage to be treated or else an excessive outlay for the construction and operation of disposal works. The cost of either plan is in most cases prohibitive unless extended over a considerable period of years.

As a practical matter, however, the attempt either to treat all of the sewage and storm water in such cases or to effect promptly the separation of the systems is usually unnecessary. There is no doubt that a stream or river of considerable size may be used as a place of disposal for a considerable quantity of sewage without appreciable harm, and in any case it is impracticable to prevent more or less pollution of the streams in a thickly populated state like Massachusetts, even with the most complete and efficient systems of sewerage, drainage and sewage disposal thus far devised. Especially is this true of a river basin containing large urban populations, where much pollution will inevitably reach the streams, even though efficient sewerage and sewage-disposal systems are in operation in all urban districts.

Under these circumstances the usual practice has been followed, that is, in cases where the sewage "a combined system of sewers requires removal or further treatment, the dry-weather flow of sewage only is cared for, including an allowance for small rains and thaws, allowing the excess of flow at times of heavier rains to continue to discharge as before. As necessity arises, the separation of the systems of sewers is effected gradually so that eventually, if necessary, all of the sewage can be treated and the pollution of the stream prevented. The separation of sewage from storm water is already being effected in large areas of the city of Boston and other parts of the Metropolitan District, as well as in several other cities and towns.

Next to a wholesome and adequate public water supply the most important factor in the improvement of the sanitary condition of thickly settled communities is an adequate and effective system of sewerage and drainage which shall remove promptly all domestic sewage and other foul wastes from the neighborhood of dwelling houses, carry off the surface water and thoroughly drain the land, and, in carrying out the laws relating to the prevention of the pollution of streams in Massachusetts, every effort has been made to promote as rapid an extension as possible of the benefits of sewerage and drainage in thickly populated districts and at the same time to maintain the streams in a condition which shall not be objectionable or injurious to the public health by reason of sewage pollution.

In view of these considerations—viz., the impossibility of preventing all pollution of a river in a more or less thickly populated valley, the natural capacity of a stream to absorb a certain amount of pollution, often without injury to the health or other interest of those dwelling farther down the valley, and the great importance of sewerage and drainage in densely populated communities—it has not been the invariable rule to require the

purification of the sewage upon the installation of a new system in a city, town or village, but to consider carefully the conditions in each case presented, including the financial resources of the community, and to adopt the course which seemed best under all the circumstances. In consequence, whenever conditions have been found in which the admission of sewage to a stream is permissible, such a method of disposal has been advised, usually for a definite period, but always with the limitation that the sewage shall be removed from the river and treated whenever, in the opinion of the Board, such a course becomes necessary.

From the time of the passage of the act of 1886 to the end of 1912, the total number of cities and towns having systems of sewers had increased from twenty-eight to 104. Of that number, twenty-two cities and towns are included in the north and south metropolitan sewerage systems, the sewage from which is discharged into the sea at two points in the outer part of Boston Harbor; fifteen others, including the city of Boston, also discharge their sewage into the sea at various points along the coast, making a total of thirty-seven cities and towns in the state having sewer outlets into the sea. The remaining sixty-seven cities and towns discharge their sewage in all cases into inland waters; of that number, thirty-two, or nearly one half, maintain purification works for the treatment of all or a part of the sewage before it enters the stream, leaving thirty-five cities and towns which at the present time discharge their sewage untreated into inland waters. Of this number, sixteen dispose of their sewage into the Connecticut and Merrimack Rivers, the former of which is excluded from the laws relating to the pollution of streams and the latter of which was also excluded until 1909. Of the nineteen cities and towns which at present discharge sewage into inland streams other than the Connecticut and Merrimack Rivers, about half were already provided with sewerage systems at the time of the passage of the act of 1886. The municipalities which have been authorized to discharge sewage temporarily without treatment into inland waters consist for the most part of comparatively small towns. In these cases the board has advised the discharge of untreated sewage directly into the river for a limited period, usually specified, but such disposal of the sewage is to cease at an earlier time if required by the board. In the cases which have arisen where such permission has been granted and subsequently terminated, no serious difficulty has thus far been experienced in securing compliance with the conditions specified.

While the number of cities and towns discharging sewage into inland rivers, other than the Connecticut and Merrimack, is somewhat greater than when the work of the board was first begun, the population of these places is for the most part small, the towns are very widely scattered and the condition of the river in their neighborhood and below is subject to regular and careful examination, in order that when the conditions appear

to require treatment of a part or all of the sewage the necessary works can be provided in sufficient season.

SOURCES OF POLLUTION NOT AFFECTED BY THE GENERAL LEGISLATION
RELATING TO THE PREVENTION OF THE POLLUTION OF STREAMS.

The effect of the application of the legislation thus far considered to the rivers of the state has been to arrest the increase in the pollution of streams and, to some extent, to recover ground lost in the years before the law was enacted, but the law of 1886 was not retroactive, and cities and towns which had already constructed sewerage systems discharging into the rivers of the state were not affected by that law. In a few of these cities purification works were installed at a later time or the sewage removed to some suitable outlet other than in the streams, but in most cases the discharge of crude sewage directly into the rivers by these cities and towns has been continued to the present time.

In some of these cases the disposal of sewage by this method has not thus far created notably objectionable conditions, but in a number of cases where the conditions have become seriously objectionable the board has endeavored to induce the city or town responsible for these conditions to discontinue the pollution of the stream after it became evident that such pollution was likely to be objectionable, and in a few cases the work has been taken up and carried out by the town without further action. A notable instance of this is the cleaning up of the Ten Mile River in the southeastern part of the state which had become badly polluted by the sewage from Attleboro and North Attleboro, towns which have an aggregate population of about 25,000. Acting under the recommendations of the board, and without being required to do so by law, these towns have installed works adequate for the complete purification of all of their sewage.

In other cases where no action could be secured on the part of the municipality responsible for the objectionable pollution of a river, the matter has been reported to the legislature and an effort made to secure the necessary legislation to require the treatment of the sewage, but very little success has attended these efforts.

The most notable result thus far secured in a recent attempt of this kind was a report of the drainage committee of the legislature that in its opinion the city in question should do something to relieve the river of the pollution caused by its sewage. Even this slight notice on the part of the legislature appears, however, to have had sufficient force to secure the construction of sewers and sewage disposal works by that city.

There still remain a few cases where the objectionable pollution of a stream is caused by the discharge from sewerage systems which were in existence before the passage of the law of 1886, yet no action has thus far been taken by the legislature to supply authority to prevent these pollu-

tions. These inequalities in the law have resulted in some cases in producing curious anomalies in the treatment of the stream pollution question in different valleys. One of the most notable of these is the situation in the Housatonic Valley in which sewerage systems have been installed in one city and five towns. Three of these municipalities have provided themselves with purification works, under the requirements of the State Board of Health, but in two of the other three, sewerage systems were in existence previous to the passage of the law, while in the third the construction of a sewerage system was authorized by the legislature without regard to the law of 1886, and these three towns continue to discharge sewage untreated into the stream. There has been a marked increase in the pollution of the river in this valley and an agitation has arisen that all of the towns shall be required to remove their sewage from the stream. It is not improbable that special legislation may be sought for the improvement of this river similar to that which has been enacted in the case of certain other rivers, of which mention will later be made.

FURTHER LEGISLATION RELATING TO THE PREVENTION OF THE POLLUTION OF STREAMS.

While the general laws already described are clear and well-defined in matters relating to the pollution of streams by cities and towns, the powers delegated to the State Board of Health for the purpose of preventing the pollution of streams by manufacturing waste were less specific, though they require the board to consult with manufacturers as to the purification of their wastes and authorize experiments to ascertain the practicable methods of treatment.

In certain of the rivers, manufacturing wastes rapidly came to be the chief causes of objectionable pollution, and this condition has led to the enactment of special legislation on the part of the state directed to the improvement of certain specific streams which had become badly polluted and were not adequately protected by the general laws. The first of these laws relates to the prevention of the pollution of the Neponset River, a small stream in the easterly part of the state which flows into Boston Harbor at the southerly boundary of the city of Boston. The condition of the Neponset River had been the subject of investigation by the State Board of Health in 1875 and again ten years later by the Massachusetts Drainage Commission, which had reported to the legislature plans for preventing the objectionable pollution of this stream. No action was taken by the legislature upon these recommendations, however, and the condition of the river was again the subject of investigation by the State Board of Health in 1890 and 1891, the results of which were also presented to the legislature.

Four years later the legislature directed a thorough investigation of the river and the condition of the Fowl Meadows, so called, an area of drowned

lands covering several square miles in the central portion of the watershed through which lay the course of the stream. This order was as follows:

RESOLVED, That the state board of health be directed to investigate the sanitary condition of the meadows on the Neponset river and the beds, shores and waters of said river in the towns of Canton, Sharon, Norwood, Dedham, Milton and Hyde Park, and report whether their conditions are dangerous or injurious to the public health by reason of stagnant water or refuse from manufactories, or other causes. If said board shall find that the condition of the meadows or of the beds, shores or waters is dangerous or injurious to the public health, they shall recommend some plan for improving their sanitary condition and for the removal of any nuisance therefrom, and report the same to the next general court. The board may expend a sum not exceeding three thousand dollars in carrying out the provisions of this resolve.

Under this legislation, the river and the Fowl Meadows were examined and their condition described in a report to the Legislature in 1897. The causes of the pollution of the river in this case were the wastes from a large number of manufacturing establishments, chiefly paper mills, tanneries, woolen mills, etc., together with a small amount of sewage from town sewers and drains and from factories and dwellings.

In its report the board recommended the following measures for the removal of the conditions which were found to be injurious to health in the Neponset Valley:

First.—Such additional legislation as will prevent the entrance into this stream of sewage and manufacturing wastes which have not been satisfactorily purified.

Second.—The permanent removal of the flashboards of the dam of the Mattapan Mills, the enlargement of the cross-section of the river at points indicated on Plan No. 3, together with a deepening and reconstruction of the channel at such places as may be found necessary for making a channel of such width and grade as will prevent the flooding of the meadows during the times of high flows in late spring and summer.

The board also made the following further general recommendations relative to more effective measures for preventing the pollution of streams:

. . . It is our opinion that all reasonable efforts have been exhausted in the attempt to do away with the remediable pollution of these waters, and that the time has come when the State must take more effective measures for the prevention of the pollution of the streams not now used as sources of domestic water supply, but still capable of injurious effect upon the public health.

These recommendations of the board, supported by petitions from the inhabitants of the valley, were considered by several successive legislatures and in 1902, five years after the report was presented, an act was passed authorizing and directing the board to prevent the pollution of these waters, but this act contained certain provisions which rendered it practically inoperative and no material progress was secured under it in preventing the pollution of the river. In the meantime, the condition of the stream grew worse and finally, in 1906, nine years after the plans for improving the river had been presented to the legislature, and specific recommendations

made for its improvement, the act of 1902 was amended and reduced to a more efficient form.

Under the interpretation of these laws by the law department of the Commonwealth, the board first gave notice to the cities, towns and others discharging pollution into the streams to discontinue such discharge unless the best practicable and reasonably available means were taken to render such waste or refuse harmless. The board then, under the provision of the act requiring it to consult with and advise the owners of factories either at their request or of its own motion as to the best practicable and reasonably available means of rendering their waste and refuse harmless, examined carefully all of the various wastes from each of the factories along the river and its tributaries and, where necessary, instituted experiments for the purpose of determining the best practicable method of purifying these wastes to such an extent that they would not produce objectionable conditions in the river. When the work was completed, the proprietor of each factory was advised as to methods which would render harmless the wastes therefrom and required to carry out the provisions of law.

The problem of purifying factory wastes, such as are found in this valley, is a very difficult one under the circumstances existing there. In some cases the factories are located in the midst of a rather dense population and areas suitable for disposal works cannot be secured in the neighborhood of the factory. In other cases, the construction of disposal works for the purification of such waste in the midst of a thickly-settled district would create a nuisance and other methods of disposal are necessary in such cases. Where a sewerage system exists in a city or town, it is practicable in some cases to admit such wastes to the sewers, but some of these wastes are of such a character as to interfere with the operation of the sewers or of sewage disposal works. Many of the works produce great quantities of waste, and as some of the works use, in dry seasons, nearly, if not quite, the whole flow of the river in their processes, it is necessary that the waste be treated in the neighborhood of the factory, in order that the water may be returned immediately to the river for the use of mills lower down the stream.

The results secured under these laws have not yet been such as to produce any marked improvement in the condition of the river which is offensive to sight and smell, in the drier part of the year throughout a large part of its course. Purification works have been begun at nearly all of the mills, and at a few of the mills all of the objectionable wastes are treated for the removal of objectionable matters, usually by sedimentation with subsequent filtration, or straining through sand, gravel, cinders or coke.

A large number of cases of pollution were long ago referred to the attorney-general, and in most of them action is still pending. Sewers or drains carrying sewage were found in two towns and these also were referred to the law department. In one of these cases the court postponed issuing a

decree in order to give the towns an opportunity to construct works and this opportunity was availed of so that no further action was necessary in that case. The other is still pending. A case against a manufacturer set down for a hearing early in the present year has been postponed to give the manufacturer further opportunity to make adequate provision for the purification of his waste liquors, which are large in amount and very objectionable. With the exception of one town, practically all domestic sewage has been removed from the river, and a manufacturing concern which recently began the discharge of sewage into the stream has been convicted in the courts. On account of the limitations of the act and the slow and cautious proceedings of the courts, the work of securing the necessary improvement of this river is slow and difficult, but by continued and persistent effort it is probable that an improvement in the condition of the river can be effected.

The other specific recommendation of the board—relating to the necessity of draining effectually the wet lands known as the Fowl Meadows—was considered by many successive legislatures, and finally in 1911 an act passed providing for carrying out the recommendations of the board and the necessary amount of money was appropriated for the purpose. This work will probably be completed in 1914.

SPECIAL LAWS RELATING TO OTHER STREAMS.

Some time after the passage of the special law relating to the Neponset River, a similar law was passed by the legislature to provide for the improvement of the Aberjona River, a small stream lying in the northern part of the metropolitan area adjacent to Boston. The towns in the valley of this stream are all provided with extensive sewerage systems connected with the north Metropolitan sewerage works and all of the wastes are disposed of finally by discharging them through the Metropolitan system. The streams in this watershed are very small, however, and when the flow is low in summer they become at times seriously polluted by drainage from large quantities of tannery and other wastes deposited in their valleys and by leakage through the floors of tanneries and other establishments, which—instead of being discharged into the sewers—is allowed to flow into the streams. An enlargement of the sewerage system in this region is now being carried out, and it will probably not be difficult to prevent the pollution of these small water courses in the future.

A special law has also been enacted for the protection of that portion of the Charles River lying within the Metropolitan district, the act in this case also being similar to the Neponset River act, except that the State Board of Health is not authorized to proceed except upon petition from certain of the municipal authorities in the valley. The sewers are available in this valley also for the removal of the manufacturing waste in nearly all

cases, and the only action required thus far has been a notice to certain manufacturers as to the necessity for caring for their wastes in such a way as not to pollute the river.

OTHER SPECIAL LAWS.

The only other stream which the legislature has thus far sought to improve by a specific law is the Blackstone River. The legislature of 1886, which passed the first important law relative to the prevention of the pollution of streams, adopted also a special act relative to the prevention of the pollution of the Blackstone River, an important clause of which is the following:

. . . The city of Worcester shall, without being limited to any particular system, within four years after the passage of this act, remove from its sewage before it is discharged into the Blackstone River the offensive and polluting properties and substances therein, so that after its discharge into said river, either directly or through its tributaries, it shall not create a nuisance or endanger the public health. . . .

Action was taken in the courts by one of the towns in the valley below the city of Worcester many years ago to secure an improvement in the condition of the river which was at that time grossly polluted by the sewage of that city. The matter remained in the courts for many years and in the meantime the city of Worcester constructed various and extensive works for the purification of its sewage which included a chemical precipitation works and an area of 73 acres of sand filter beds, by which a part of the sewage is filtered and the remainder subjected to chemical precipitation.

The Blackstone River in more recent years has become seriously polluted in other parts of its course by manufacturing waste and by the drains in villages which have come to be used as sewers. Its condition is very objectionable and some further legislation is likely to be required before a material improvement can be effected.

Very important among the special laws relating to streams are those which in specific cases give authority to cities and towns to take and control the natural streams within their limits. Under such authority it is practicable for a city or town to deepen, straighten and improve the local water courses and maintain them in satisfactory condition, a difficult problem in thickly settled regions unless the channels are covered.

LOCAL LAWS RELATIVE TO STREAM POLLUTION.

Many of the serious pollutions of the smaller streams and the local nuisances caused thereby occur within the limits of a single city or town and in such cases the powers of the local health authorities under Massachusetts laws are ample for the prevention of nuisances. In case of the neglect or refusal of a local board of health to take proper action relative to a nuisance, an appeal may be had to the county commissioners, but no appeal to the State Board of Health has been provided in such cases. Either party can,

however, request the advice of the State Board of Health as to proposed plans or measures for the removal of the objectionable conditions complained of, and confidence in the efficacy and reasonableness of the recommendations of the board has commonly secured the action necessary to relieve the nuisance. The right of appeal to the county commissioners is rarely used.

ACTIONS AT LAW FOR THE PREVENTION OF THE POLLUTION OF STREAMS.

In a number of instances, especially where a manufacturer considers that his rights are infringed by the pollution of a river by a town or factory discharging waste into the stream above him, action has been brought in the courts to secure an injunction against the pollution of the river, and usually damages for the injury alleged to have been sustained.

Several such suits have been successful, and in discussing the question of stream pollution in one of its decisions, the Supreme Court made the following observations:

The right to use the stream to carry away mere waste matter in a reasonable manner and to a reasonable extent is not so to be extended as to include a right to discharge into the stream noxious and deleterious matter to such an extent as sensibly and materially to foul the water and destroy its purity and fitness to be used by others.

It is true of course that there is in any large body of water a purifying principle which will, either by ordinary sedimentary deposit or by chemical change, obviate the evil effects which otherwise would arise from the deposit therein of some limited amount of noxious matter. Accordingly it is not for every small deposit of such matter that the law will give a remedy. . . . There doubtless must be a material and sensible deterioration of the quality of the water. . . .

THE MERRIMACK AND CONNECTICUT RIVERS.

In all of the general laws relating to the prevention of the pollution of streams as originally enacted and as subsequently amended or codified, a special provision has been inserted that the requirements of the act were not to apply to the Merrimack and Connecticut Rivers, nor to so much of the Concord River as lies within the limits of the city of Lowell.

The Merrimack and Connecticut Rivers are the largest streams in the state and each of them receives much pollution from beyond its borders. In each case, also, large quantities of sewage were being discharged into the stream by the cities and towns along its banks in the course of its flow through the state, previous to the time when the laws relating to the prevention of the pollution of streams were first enacted.

The objectionable conditions of the Merrimack River arise almost entirely from two principal causes; one, the discharge into the river at Lawrence of an enormous quantity of waste from the process of wool scouring, and, two, the fouling of the banks of the river by sewage from the sewer

outlets of the large cities located along its banks, which discharge in most cases at the edge of the river bank at high water, whence the sewage flows across the exposed bottom of the stream in the summer season to the low-water channel, greatly fouling the banks and bed of the river, which are offensive at numerous places in these cities.

These conditions can be remedied without difficulty by the cities themselves if they choose to do so. Notwithstanding that the matter has been called to their attention frequently, they have failed thus far to provide proper outlets for their sewage. The new sewer outlets in these rivers, however, have been carried well out into the low-water channel and the offensive pollution of the banks of the river in these few cases avoided.

The Connecticut River has a drainage area nearly twice as great as the Merrimack where it passes out of Massachusetts, and the urban population of the Connecticut valley is much smaller than that of the Merrimack. In consequence, the dilution of the sewage is much greater. While much manufacturing waste is discharged into the Connecticut River, both within the state and in its upper waters before reaching the state, the condition of the bed, banks and waters of the river has not become objectionable at any point except in the neighborhood of some of the sewer outlets of the principal cities and towns, where the conditions are much the same as those already described in the cities of the Merrimack valley.

Much improvement has been made in recent years along the Connecticut River, many of the principal sewer outlets have been extended a distance of 200 to 300 feet into the stream, and the number of objectionable sewer outlets is few compared with the Merrimack valley. The sewers in the principal cities in the valleys of the Connecticut and Merrimack Rivers are nearly all constructed upon the combined plan and the complete removal of sewage from these rivers would require the introduction of separate systems of sewers in the greater part of nearly all of these cities. Circumstances have not become such as to require the treatment of the sewage of the cities and towns bordering these rivers as yet, though the problem of dealing with the sewage of cities along the Merrimack River may become a serious matter at no distant time.

Both of these rivers receive much pollution from manufacturing wastes in addition to the sewage, and in later years the condition of the Merrimack River has become seriously objectionable below the city of Lawrence and special legislation was secured in 1909 directing the State Board of Health to investigate and report upon the sanitary condition of the bed, banks and waters of this river, to ascertain whether it was in a condition injurious or dangerous to the public health or likely to become so, and, if so, to recommend plans for the removal of objectionable conditions. The board presented a report upon the matter to the legislature of 1909, and upon its recommendation this river was subjected to the same regulation as the

other streams of the state under the laws relating to the prevention of the pollution of streams.

Subsequently, under the further requirement of the legislature, the board continued the examination of this river and presented to the legislature of 1913 a detailed statement of the sources of pollution, together with plans for removing the most important of the pollutions of the stream and making such changes in the sewer outlets in the cities and towns along its banks as would prevent further objectionable conditions. This report was presented to the legislature of 1913 and referred to the committee on public health, which committee promptly reported no legislation necessary.

SUMMARY.

In so far as the rivers of the state in general are concerned, the powers contained in the law of 1886, as amended in 1888, and supplemented later by the acts relating to sewer outlets and to the maintenance of sewage purification works, are the only general powers which have thus far been delegated by the legislature to the State Board of Health for the prevention of the pollution of streams and inland waters.

These laws are not mandatory except that they require the submission of plans to the State Board of Health for its advice, and no penalty is provided for neglect to observe them or carry out the recommendations that the board may make. Nevertheless, the recommendations of the board have almost invariably been followed, and the requirements of these laws very rarely evaded. The success that has attended the execution of these laws is attributed very largely to the course followed in carrying out their requirements. The board employed, from the beginning, physicians, engineers, chemists and other experts trained in this work and, aided by the results of thorough scientific investigations at Lawrence, was enabled to give reliable advice on questions relating to the purification of sewage and manufacturing waste and the measures necessary to prevent the objectionable pollution of streams. The reasonableness of its recommendations in the solution of practical problems quickly commended itself to the public and, taken as a whole, these acts have operated effectually and satisfactorily, with little friction, in the prevention of the objectionable pollution of inland waters in Massachusetts. Had they been in force at an earlier time and been applied to all of the inland waters of the State, the objectionable pollution of the streams by the sewage of cities and towns would to a large extent have been prevented.

The results of efforts to redeem the rivers which had already become badly polluted before the passage of these acts and to remove objectionable pollution not reached by those laws has been less satisfactory. In the cases in which the Legislature has been urged to interfere, action has often been avoided and in the most extreme cases where tardy action has finally been

taken, the limitations of the law and the cautious action of the courts have made progress under such laws extremely slow.

Nevertheless, progress is being made in the improvement of polluted rivers even under these circumstances, and there appears to be a growing recognition on the part of the authorities of cities and towns and the owners of factories of the demand that rivers shall not be used indiscriminately for the removal of sewage and foul waste to such an extent as to make them objectionable. But it is difficult to secure adequate laws for the relief of rivers already excessively polluted by the sewage of those cities and towns which will not voluntarily undertake the necessary improvement, unless there is evidence that the conditions are such as to be dangerous to the public health.

While at the present time there seems to be no danger that the desire for cleaner streams be carried too far or that experienced health authorities will attempt the application of impracticable standards to streams not used as sources of water supply, it is easily possible to go to extremes in this matter and, by attempting to apply unreasonable standards, to produce a reaction unfavorable to continued progress in the work of securing and maintaining cleaner streams.

It is important to recognize always the fact that it is impracticable to keep all pollution out of streams draining populous territories, especially regions containing numerous industries of the kinds which foul large quantities of water in their processes. The effluents from purification works alone, no matter how well conducted they may be, will inevitably cause some pollution of the streams, and the washings from streets, gardens, yards, factory grounds, etc., will contribute a further and by no means an insignificant quantity, as experience has shown in the valleys of rivers of considerable size, where thorough sewerage has made possible the complete removal of all sewage and objectionable manufacturing waste. Nevertheless, in some cases such streams are being maintained in such condition that they are not objectionable either to sight or smell. Their waters show upon analysis a much greater degree of pollution than those of rivers draining strictly agricultural regions, however populous, just as the waters of the latter are inferior in purity to those of the mountain streams, but their condition is unobjectionable for any reasonable present purpose, and they are not a menace to the public health.

In the efforts to prevent the pollution of streams and to do away with remediable pollution in cases where it has become objectionable, the results sought must be those which will secure the most effective sanitary improvement practicable for the inhabitants of the region affected, and the circumstances in each case must determine the course to be followed in regulating the use of the streams and inland waters as the ultimate places of disposal for sewage and manufacturing wastes.

SEWAGE DISPOSAL AND STREAM POLLUTION IN MINNESOTA.

FREDERIC BASS,
Engineer, State Board of Health.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

The population of the state of Minnesota is largely rural, for less than one half of the population reside in communities of four hundred and over.

In Table I the communities of the state are divided into five classes according to population, all communities of four hundred population or over being included. Thirty-nine per cent. of these communities have sewerage systems and a little over 11 per cent. have sewage disposal plants.

TABLE I.

Population.	No. of communities.	Aggregate population.	No. having sewerage.	Sewage disposal plants.
Over 3,000	39	831,068	38 or 97%	
2,000-3,000	26	61,183	16 " 62%	
1,500-2,000	30	40,063	12 " 40%	
1,000-1,500	50	58,755	20 " 40%	
400-1,000	120	82,093	20 " 17%	
	265	1,083,100	106 or 39%	23 or 11%

The state law in regard to the pollution of streams is as follows:

Sec. 2147. No sewage or other matter that will impair the healthfulness of water shall be deposited where it will fall or drain into any pond or stream used as a source of water supply for domestic use. The State Board of Health shall have general charge of all springs, wells, ponds, and streams so used, and shall take all necessary and proper steps to preserve the same from such pollution as may endanger the public health. In case of violation of any of the provisions of this section, the State Board may, with or without a hearing, order any person to desist from causing such pollution, and to comply with such direction of the Board as it may deem proper and expedient in the premises. Such order shall be served forthwith upon the person found to have violated such provisions.

Sec. 2131. The State Board of Health may adopt, alter and enforce reasonable regulations of permanent application throughout the whole or any part of the state for the preservation of the public health. Upon the approval of the attorney general, and the due publication thereof, such regulations shall have the force of law, except in so far as they may conflict with a statute or with the charter or ordinances of cities of the first class upon the same subject. In and by the same, the board may control by requiring the taking out of licenses or permits or by any other appropriate means, any of the following matters: . . . 5. The pollution of streams and other waters, and the distribution of water by private persons for drinking or domestic use.

There are nineteen communities, with a total population of 147,000, which violate the law in regard to the pollution of streams used as domestic water supplies.

There are eleven cities, with a total population of 430,000, which are adversely affected by this municipal pollution of water and of these eleven, eight are among the nineteen polluters and contain 89 per cent. of the population of the polluting cities.

Of these twelve cities taking their water supply from streams polluted by municipal sewage, ten are protected by some water purification process and two are unprotected. The population of these two unprotected cities is equivalent to 5 per cent. of the total population of the cities affected, and equivalent to three tenths of 1 per. cent of the population of the state. The polluting cities are given in Table II and the cities affected by pollution are given in Table III.

Of the twenty-eight sewage disposal works in the state, seven are located on streams used below for municipal water supply and may be considered as having been built in an attempt to comply with the law, although in the cases of only two of them would it be possible to operate the plant so that the water supply would not be polluted. The other twenty-one sewage purification plants are located on small streams or lakes not used for domestic purposes and their ostensible purpose, therefore, is to prevent a local nuisance.

TABLE II.

City.	Populations.	Disposal.
Brainerd.....	8,526	No plant
Little Falls.....	6,078	"
St. Cloud.....	10,600	"
Anoka.....	3,972	"
Cambridge.....	900	"
Milaca.....	1,102	"
Princeton.....	1,555	"
Fergus Falls.....	6,692	"
Crookston.....	7,559	"
Montevideo.....	3,056	"
Two Harbors.....	4,990	Septic tank
Duluth.....	78,446	No plant
Thief River Falls.....	3,714	Imhoff tank
Red Lake Falls.....	1,757	No plant
Breckenridge.....	1,840	"
Grand Rapids.....	2,230	"
Monticello.....	858	"
Ely.....	3,572	Imhoff tank
	147,447	

City.	Popu-lation.	Type of plant.	Date in-stalled.	Oper-ated now.	Why Installed.		
					Protect water supply.	Protect another city's w. s.	Abate a nuisance.
Ada.....	1,432	Screen.	1910	Yes			Yes
Alexandria.....	3,001	Septic tank	1910	Yes			Yes
Anoka Asylum...	800	Imhoff tank	1912	Yes		Yes	
Baudette.....	897	Septic tank	1909	Yes			Yes
Bemidji.....	5,099	Septic tank	1911	Yes			Yes
Bovey.....	1,377	Septic tank	1907	No inf.			Yes
Canby.....	1,528	Septic tank	1910	Yes			Yes
Coleraine.....	1,613	2 septic tanks	1909	No inf.			Yes
Detroit.....	2,807	Septic tank	1909	Yes			Yes
Elbow Lake.....	776	Septic tank	1908	No inf.			
Ely.....	3,572	Imhoff tank	1911	Yes			Yes
Fairmont.....	2,958	Septic tank		Yes			
		and sand fil.	1906	No			Yes
Gilbert.....	1,700	Imhoff tank					
		and percol. fil.	1911	Yes			Yes
Glenwood.....	2,161	Septic tank	1904	No inf.			Yes
Hallock.....	910	Septic tank	1907	Yes			Yes
Litchfield.....	2,333	Imhoff tank	1912				Yes
Morris.....	1,685	Septic tank	1906	Yes			Yes
Pipestone.....	2,475	Septic tank	1907				
		and percol. fil.	1908	Yes			Yes
Two Harbors.....	4,990	Septic tank	1907	No	Yes		
Warren.....	1,613	Septic tank	1910	Yes			Yes
Waseca.....	3,054	2 sep. tanks	1907	No inf.			Yes
Willmar.....	4,135	Imhoff tank	1913				Yes
Willmar Hospital.		Imhoff tank					
		and percol. fil.	1912	Yes			Yes

City.	Sewage discharged into.	Char. of sewage predominating.	Dist. sewer outlet to water intake.	Source of water supply.
Ada.....	Wild Rice River	Domestic	100 miles	
Alexandria.....	Lake Agnes			Well
Anoka Asylum.....	Rum River		15 miles	Tubular well
Baudette.....	Baudette River		$\frac{1}{4}$ mile	Rainy River
Bemidji.....	Mississippi			Tubular well
Bovey.....	Trout lake			"
Canby.....	Florida creek			"
Coleraine.....	Trout Lake			Mine drift
Detroit.....	Lake St. Clair			Detroit Lake
Elbow Lake.....				
Ely.....	Shagwa lake		1 mile	Shagwa lake
Fairmont.....	Lake George			Budd lake
Gilbert.....	Embarrass River			Genoa mine
Glenwood.....	Lake Minnewaska			Springs
Hallock.....	Two Rivers			Two Rivers
Litchfield.....	Crow River			Tubular well
Morris.....	Pomme de Terre R.			"
Pipestone.....	Dry run			"
Two Harbors.....	Lake Superior		$\frac{1}{2}$ mile	Lake Superior
Warren.....	Snake River			
Waseca.....	Slough			Tubular well
Willmar.....	Drainage ditch			"
Willmar Hospital.....	Foot lake			"

TABLE III.

City.	Population.	Protection.
St. Cloud.....	10,600	Hypochlorite
Little Falls.....	6,078	"
Brainerd.....	8,526	"
Minneapolis.....	301,408	Filter and hypo.
Breckenridge.....	1,840	" "
Ely.....	3,572	" "
Granite Falls.....	1,454	Not protected
		Water little used
Two Harbors.....	4,990	Hypochlorite
Duluth.....	78,446	"
Crookston.....	7,559	"
E. Grand Forks.....	2,533	Filter and hypo.
Moorhead.....	4,840	Not protected
	429,772	

From the tables it is apparent, therefore, that the problem of stream pollution in its relation to public health as distinct from the question of decency is limited to a comparatively few communities and to a small portion of the population of the state. There are many communities which should have sewerage systems and sewage disposal plants which do not have them. There is no doubt of the great value from a public health standpoint of a sewerage system, and a sewage disposal plant may be considered as an adjunct to the sewerage system and in that way, in Minnesota, an agency for the benefit of the public health, but by itself, it has value in Minnesota chiefly as a means of preventing a nuisance.

PRESENT STATUS OF WATERWAYS SANITATION IN MONTANA.

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Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs,
September, 1913.

There are still many mountain streams in Montana that are practically in their natural state of purity above human habitation. Many city water supplies are taken from such streams. In some cases the cities control the watersheds and are able to effectively prevent undue contamination. In other instances more attention should be given to sanitary conditions on the water sheds. Some of the more important city supplies taken from mountain streams are listed below: Anaconda, Butte, Bozeman, Bellgrolle, Deer Lodge, Missoula, Dillon, Helena, Hamilton, Red Lodge, Stevensville, etc.

A mountain stream soon becomes contaminated to a greater or less degree as it flows through an inhabited valley. The most important rivers in the state are: the Yellowstone, Missouri, Milk, Deer Lodge, Missoula, and Bitter Root.

All of these rivers receive untreated city sewage and contamination from the watersheds. Waste irrigation water returning to the rivers is an important factor in contaminating waterways in Montana.

There are no streams in Montana that are so highly contaminated as to create a nuisance.

Analyses, sanitary inspections and health statistics show that only in a few places on any of these rivers should water be taken for city use without purification.

None of these rivers are contaminated at present by city sewage to the extent that an undue burden would be put on water purification plants, erected for treating water for domestic use.

In many instances the sanitary conditions of the watersheds would make it desirable to purify surface waters before use, even if no city sewage were delivered to the streams. This condition arises from the contamination deposited on the watersheds near the streams from passenger trains and also because of the return of waste irrigating water to the streams.

People in many portions of the state depend on surface water supplies because ground waters are frequently highly charged with mineral salts. This condition makes it necessary sometimes to use questionable surface waters.

THE STATUS OF STREAM POLLUTION AND SEWAGE TREATMENT IN OHIO.

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Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs,
September, 1913.

In presenting the present status of stream pollution and sewage treatment in Ohio, it will be my aim to briefly discuss the legislation which has been enacted to prevent stream pollution; the existing cases of stream pollution in the state; the development of sewage treatment plants; and the difficulties which are encountered in preventing and correcting the pollution of streams.

LEGISLATION.

In the state of Ohio legislation directed against the pollution of streams has been quite progressive, and at the present time laws exist which make it possible to prevent and correct conditions which cause streams to become unsightly, odorous and unhealthful.

In 1893 the legislature of the state of Ohio passed a bill (Sec. 1240, General Code of Ohio) providing that no public water supply or sewerage system or purification works for a water supply or sewage shall be installed until the plans have been submitted to and approved by the State Board of Health. A penalty of not less than \$100 nor more than \$500 is attached for violation of the provisions of this section.

This law has been an important factor in the prevention of stream pollution and in insuring that water supplies of good quality be installed. It, however, fails to supply a remedy for the pollution of streams resulting from sewage discharged through outlets installed prior to 1893. In 1908 the so-called Bense Act (Sec. 1249-1261, General Code of Ohio) was passed, which gives the State Board of Health power to order the installation of water purification plants and sewage treatment works after due investigation has demonstrated their necessity. The passage of this act has furnished means whereby stream pollution, resulting from sewage and other wastes discharged through municipal sewers, or from manufacturing plants, may be corrected. This law was thrown into litigation soon after its passage and did not become fully effective until April, 1912, when the Supreme Court decided its constitutionality.

Small buildings, private institutions, hospitals, and the like, cause minor sewage pollution and create local nuisances. To bring about a correction of these conditions, a section of the Ohio Building Code, passed in 1911,

regulates the disposal of wastes and provides that plans for sewage treatment plants for such buildings shall be approved by the State Board of Health.

Numerous cases of serious stream pollution have occurred in the outskirts of the larger cities of the state, due to the absence of sewers immediately within the city and the inability of any authority to build sanitary sewers outside the city. In 1913 a bill was passed providing that the county commissioners of any county may establish sewer districts within three miles of any municipality. Furthermore, the State Board of Health may, upon investigation, order the installation of sewers and sewage treatment works in such districts. In cases where the district naturally forms a drainage area in which a portion of a municipality is included, coöperation between the county and municipality is permitted.

STREAM POLLUTION.

Before describing the conditions of stream pollution and sewage treatment in Ohio, it may be well to give a brief description of the state as a whole. The divide between the watershed of the Great Lakes and the Ohio River crosses the northerly portion of the state of Ohio. The area north of the divide, including the islands in Lake Erie, is tributary to Lake Erie and comprises about 30 per cent. of the total area of the state. It is drained by a number of streams, the largest of which is the Maumee River, with a watershed area of about 6,600 square miles, 4,580 square miles of which are in Ohio. Of the other streams traversing this area, only one, the Sandusky River, has a watershed area of more than 1,000 square miles. The rivers of Ohio, tributary to Lake Erie, are the Maumee, Portage, Sandusky, Huron, Vermilion, Black, Rocky, Cuyahoga, Chagrin, and Grand. The topography of this section of the state is generally flat with a moderate slope toward the lake. The streams follow a general northerly direction. The area south of the divide comprises 70 per cent. of the state and is naturally subdivided into five principal drainage areas, all tributary to the Ohio River. The principal streams of this portion of the state are the Mahoning (a tributary of the Beaver River), Muskingum, Hocking, Scioto, Little Miami, and Great Miami Rivers.

Having in mind a general conception of the drainage features of the state, it may be well to review briefly the conditions existing in each drainage area. We shall first consider that portion of the state tributary to Lake Erie. With the exception of the Maumee River, the streams on this area are so small that, with any considerable urban population, excessive pollution would be inevitable without sewage treatment plants. As it happens, the principal cities of this section of the state are at or near the mouths of the rivers or on Lake Erie, and consequently the greatest pollution occurs at

these points. The Maumee and Cuyahoga watersheds are the only ones which have important cities located above the mouths of the rivers.

The Maumee River itself is at no point polluted to an extent to give rise to a nuisance. Its tributaries, however, receive serious pollution at various points. At Toledo, Swan Creek and Ten Mile Creek are notoriously polluted. At Lima, the Ottawa River is rendered very offensive. At Findlay, the Blanchard River is visibly polluted. At Wapakoneta, the Auglaize River is rendered offensive during periods of low flow. At Van Wert, a county ditch is converted into an open sewer. At Bryan, manufacturing wastes pollute a small ditch. At Wauseon, the wastes from a condensary pollute Turkey Foot Creek, and at Paulding, Flat Rock Creek is seriously contaminated by the wastes from a beet sugar factory. Plans are in preparation for the improvement of conditions at Toledo, Lima, and Wapakoneta, and plans have been prepared to correct the pollution at Bryan.

The Portage River is at no point visibly polluted by sewage. Small tributaries at Fostoria and Bowling Green are, however, rendered very offensive. Steps have been taken to correct the conditions at Fostoria by the reconstruction of the existing sewage treatment plant installed in 1896, and at Bowling Green the conditions will probably be improved within a few years. The Sandusky River is seriously polluted at only one point, immediately below Bucyrus. The State Board of Health has ordered the installation of a sewage treatment plant at this point and plans are in preparation.

No case of stream pollution exists on the Huron River watershed except at Norwalk, where Norwalk Creek and the east fork of the Huron River are contaminated by sewage. Plans for a sewage treatment plant for this city have been prepared. The Vermilion, Black and Rocky Rivers are not seriously polluted at any point above their mouths. The sewage from Lorain causes some pollution of the Black River at its point of discharge into Lake Erie and the Rocky River is polluted to a slight extent by sewage from the city of Lakewood located at its mouth. The Little Cuyahoga River below Akron is seriously polluted by the sewage from the city. The State Board of Health has ordered the installation of a sewage treatment plant at Akron and plans are being prepared. The Cuyahoga River at Cleveland has for a number of years been rendered extremely offensive by the sewage from about one half of the city. The State Board of Health has ordered the abatement of these conditions and studies leading to the installation of treatment works are being made. The Chagrin River is not seriously polluted at any point. The Grand River is rendered unsightly and offensive by the wastes from chemical works located near its mouth.

Lake Erie itself is polluted by the sewage from Cleveland, Toledo, Lorain, Sandusky, Ashtabula and Conneaut. The evidence of this pollu-

tion exists in the harbors, at the mouths of the rivers, and as far upstream as slack water extends. At Cleveland, visible pollution has been noted in the vicinity of the outlet of the main intercepting sewer discharging into Lake Erie.

We shall next consider that portion of the state tributary to the Ohio River. The Mahoning River is polluted by the sewage from Warren, Niles, and Youngstown, which cities are contiguous along the stream a short distance above the point where it leaves Ohio and enters Pennsylvania. Plans for sewage treatment for Niles and Warren have been prepared.

The Muskingum River is not visibly polluted by sewage. Several of its tributaries, however, are rendered offensive. The principal cases of stream pollution are at Cambridge, where Wills Creek is contaminated by the sewage from the city and by acid iron wastes; at Canton, where Nimishillen Creek becomes a nuisance during low flow; at Massillon, where the Tuscarawas River is somewhat polluted; at Barberton, where Wolf Creek and the Tuscarawas River receive sewage and manufacturing wastes in an amount to create a nuisance; and at Dennison and Uhrichsville, where Stillwater Creek is rendered very offensive. Canton has been ordered by the State Board of Health to abate the existing nuisance in Nimishillen Creek and plans are being prepared. Steps are also being taken by the State Board of Health to bring about an improvement in the disposal of sewage at the other points mentioned.

The Scioto River receives sewage pollution near its headwaters from the cities of Kenton and Marion, and other cases of serious pollution exist at Delaware, where the Olentangy River is contaminated, at Marysville where Mill Creek is polluted, and at Washington C. H., where Paint Creek is rendered very offensive. Plans for a sewage treatment plant for the last mentioned city have been prepared and a plant is being installed at Marysville. A tributary of the Little Miami River receives sewage from Xenia and is polluted to a greater extent than any other stream on this watershed. Turtle Creek below the village of Lebanon is also seriously polluted. The State Board of Health is now considering the advisability of ordering the abatement of these conditions. Although the Great Miami River watershed is rather densely populated and has a number of important cities, there exists no case of serious stream pollution. This is due to the fact that the large communities are located in the valleys and upon the principal streams of this drainage area.

Upon that area which is tributary directly or through minor streams to the Ohio River there is only one instance of serious stream pollution, namely, in Mill Creek, which passes through the city of Cincinnati and receives large volumes of sewage and manufacturing wastes. This stream is one of the most polluted water courses within the state and although the

nuisance has existed for a number of years, it has only been recently that definite plans for the abatement of the conditions have been prepared.

In the above brief discussion thirty-one cases of stream pollution in Ohio are mentioned. Plans for the correction of eight of these cases have been prepared and the State Board of Health has ordered improvements in six other cases. Attention is being given to the conditions existing in thirteen of the cases mentioned, and the municipalities have been advised of the necessary improvements. Orders may be issued by the board in the near future to correct the conditions in several of these cases.

SEWAGE TREATMENT.

The first sewage treatment plant in Ohio was installed at Canton in 1893. In accordance with accepted practice at that time chemical precipitation tanks were provided. Two years afterwards a similar plant was installed at Alliance, but since that time no plant of this type has been installed in Ohio. The first plant utilizing intermittent sand filtration as a final process was installed in Oberlin in 1894 and since that date the use of this type of plant has been general. The first plant, including contact filters, was installed at Lakewood in 1901 and its operation was attended with such great success that a number of plants of this type have been installed in other cities. The first plant employing sprinkling filters as a device was installed at Medina in 1906 and two years later the Columbus plant was installed.

Since 1893 the number of municipal sewage treatment plants in Ohio has increased to fifty and the population of the communities served from 27,500 to 485,000. Of the forty-six municipal plants, installed prior to 1913, twenty-five have intermittent sand filters as a final treatment device and sixteen include contact filters in the process of treatment. Only three sprinkling filter plants have been installed, but these serve a greater population than any other type of plant, due to the use of this type of plant at Columbus.

Of the forty-six plants, thirty-one were provided to comply with orders or advice of the State Board of Health, and the others were installed voluntarily on the part of the municipality or to prevent damage suits. Relative to the condition of the plants, thirty-one may be said to be in good condition, ten inadequate, and five inefficient. Plans for improvement of three of the ten plants which are inadequate have been prepared, and the State Board of Health will probably order the improvement and enlargement of two other plants which are at present useless. The five plants which are inefficient have become so through neglect of their regular operation.

Sewage treatment plants for public and private institutions have been installed at various times since 1896. Up to the present year thirty-six plants have been installed or are in progress of construction, and the population served is about 18,000. Of the thirty-two plants which had been

installed prior to 1913, twenty-seven employ intermittent sand filters as a final process of treatment. Other types represented are tanks alone, tanks and contact filters, and tanks and coarse grain filters.

At the present time a remarkable development in sewage treatment in Ohio is in prospect. Cleveland, Toledo, Akron, Canton, Lima, and Sandusky, cities ranging in population from 20,000 to 625,000, are engaged in studying their sewage disposal problems with a view to installing sewage treatment plants to avoid excessive pollution of streams. In addition, plants are in prospect in nineteen other smaller cities and villages of the state. The population represented by the twenty-five municipalities for which plans have been prepared or are in preparation for sewage treatment plants is 1,100,000, which is over twice the population at present served by the sewage treatment plants of the state. We may reasonably expect that within ten years the sewage from the principal cities of the state will receive treatment before it is discharged into streams.

DIFFICULTIES ENCOUNTERED IN THE PREVENTION AND CORRECTION OF STREAM POLLUTION.

In the prevention and correction of stream pollution, the State Board of Health experiences considerable difficulty. The cities of the state seem to be entirely willing to coöperate in correcting stream pollution and the board has been very successful in securing the establishment of sewage treatment plants in cases where stream pollution exists, as well as in those cases where cities propose the establishment of new sewer systems. The question is frequently submitted to the board, however, to determine the required degree of treatment which the sewage from any particular municipality should receive. While this is essentially a question to be decided by a consulting engineer employed by the city, nevertheless, inasmuch as the State Board of Health is the final authority, the question may logically be submitted to that body. Our knowledge of the flow of streams in Ohio is very limited, inasmuch as no comprehensive measurements of stream discharge have been made. We must rely upon estimates which are at best rough approximations. The fundamental consideration to be given in determining upon the required degree of treatment of sewage to avoid nuisance is the dilution afforded by the volume of flow of the stream. Efforts are now being made to secure means whereby comprehensive stream flow measurements can be made in various portions of the state.

One of the most important difficulties encountered in preventing stream pollution is the failure to secure proper operation of the sewage treatment plants after they are installed. This is of course general throughout the country and is not peculiar to Ohio. Concerted efforts have been made by the State Board of Health to improve the operation of existing plants and in some cases good results have been obtained. The neglect of sewage

treatment plants has been so forcibly brought to the attention of the State Board of Health that an attitude has been adopted to bring about the installation of plants of as simple a type as is possible to obtain the results required. Thus where the flow of a stream is sufficient to avoid nuisance and no water supply is endangered, tank treatment would be preferred to more refined methods, especially in the smaller communities.

Improved legislation which would give the State Board of Health the power to prevent the discharge of manufacturing wastes into streams by making it necessary that plans for treatment of the wastes be submitted before a manufacturing plant is established, would do much to simplify the problem of stream pollution. In many cases plants contribute liquid wastes which pollute streams more seriously than the sewage from cities and great difficulty is experienced in securing an improvement.

In conclusion the magnitude of the problems associated with the prevention and correction of stream pollution in Ohio is recognized by state and municipal authorities. Progressive legislation, giving considerable discretionary power to the State Board of Health, has been the principal factor in bringing about needed improvements. In addition to its actual enforcement of the law the State Board of Health has secured improvements in numerous cases by giving to municipalities general advice relative to the prevention of stream pollution.

The large number of sewage treatment plants in existence and in prospect testifies the coöperation which is being secured between the health department of the state and the various municipalities. The present activity in the large cities of the state encourages one in the belief that improved disposal of sewage for those cities will be realized within a few years.

The lack of certain fundamental data necessary in the solution of stream pollution problems, particularly thorough knowledge of the volume of discharge of streams, introduces a serious difficulty in the administrative work of the State Board of Health. It is intended to obtain comprehensive stream flow measurements as soon as funds for this purpose can be secured. The neglect of the operation of sewage treatment plants is also a serious detriment to a broad solution of stream pollution problems. It is difficult to correct the tendency upon the part of municipal authorities to treat with indifference the work connected with sewage disposal and in many cases it is only by frequent inspections on the part of a central authority that satisfactory operation of plants can be secured.

CONDITIONS IN VIRGINIA WITH RESPECT TO STREAM POLLUTION.

RICHARD G. MESSER, C. E.,
State Sanitary Engineer.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

So far the subject of stream pollution in the state of Virginia has received very little attention and, except in one or two instances mentioned later, no data of importance have been collected for the purpose of showing the degree of pollution of the different streams.

At the present time there are no special laws in this state giving the Board of Health authority to make regulations in regard to the disposal or treatment of sewage and trade wastes. Individuals or communities must base their claims for damages on previous decisions defining the rights of riparian owners as determined in the courts of common law. These decisions refer for the most part to the excessive pollution of small streams where the waters are rendered unfit for agricultural uses and do not as a rule apply to the larger rivers under discussion.

There are in Virginia only two towns maintaining plants for the treatment of sewage: Winchester, having a population of 6,000, and Colonial Beach, a summer resort, which has a winter population of about 1,000 and a summer population estimated 12,000 to 15,000. Several towns in accordance with recommendations made by the board have under consideration the installation of treating plants. Disposal by dilution has been in the past and in all probability will continue to be for a number of years the general method.

It is the opinion of the writer that the time has not arrived in this state to urge artificial treatment of sewage with the object of maintaining a high standard of purity of the larger rivers except in some special cases. The statistics on the next page as to conditions will explain why the subject has not assumed the importance here that it has in many other states.

It will be noted that there are only eighteen places having a population exceeding 5,000, and that the total for these is only 20.8 per cent. of the population of the state.

Furthermore, most of the larger cities and towns are situated in the eastern part of the state from which the sewage is discharged into the Chesapeake Bay or into the James, York, Rappahannock and Potomac at tide level.

STATE OF VIRGINIA.

Total area in square miles.....	40,125
Drainage areas.....	12
Total population (1910).....	2,061,612

TABLE SHOWING DISTRIBUTION OF TOTAL POPULATION.

Population (1910).	Number of places.	Total population.	Per cent. of state total.
Above 100,000	1	127,628	6.1%
50,000-100,000	1	67,462	3.2
10,000-50,000	8	186,843	9.0
5,000-10,000	8	52,890	2.5
1,000-5,000	57	116,374	5.6
Total above 1,000			26.4%
Rural population			73.6

The following table gives the classification by population of places discharging sewage into tidal waters:

Population, 1910.	Number of places.	Total.	Per cent. of state total.
Above 50,000	2	195,190	9.3
10,000-50,000	4	92,851	4.5
5,000-10,000	4	23,387	1.1
1,000-5,000	7	13,460	0.6
			15.5

The principal facts brought out by the two tabulations above are:

1. Virginia has a large rural population about 73.6 per cent.
2. That of the remainder, sewage from 15.5 per cent. is discharged into large rivers at tide level or directly into Chesapeake Bay.
3. That only 10.9 per cent. of the population in places exceeding 1,000 contribute to the pollution of the twelve principal streams.

The special cases referred to which are now under investigation are:

1. The pollution of James River by trade wastes. The James has a drainage area of about 9,700 square miles and a length of about 335 miles. The principal cause of complaint is due to the discharge of sulphite waste liquors from the mills at Covington. The dark discoloration caused by these sulphite wastes is often noticeable as far down as Richmond, a distance of 250 miles. Attempts to have a law passed to regulate the disposal of manufacturing wastes have been defeated by the interests affected.

2. The pollution of valuable oyster grounds near Hampton Roads and along the Potomac River. Several cities and towns have under consideration the purification of sewage as a result of investigations and recommendations made by the State Board of Health.

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THE NEW YORK PUBLIC HEALTH LAW.

Our readers will remember that the Public Health Law of New York State enacted in 1913 introduced two new and exceedingly promising features into State sanitary legislation. The power to establish a sanitary code for the entire State outside of New York City was vested in the hands of a Public Health Council of seven members; while the administration of this code and of the general Public Health Law of the State by the locally appointed health officials was placed under the general supervision of the

State Commissioner of Health with twenty District Sanitary Supervisors acting as intermediaries.

The first fruits of the work of the Public Health Council are now at hand in the shape of Chapters I and II of the Sanitary Code dealing respectively with Definitions and General Provisions and with Communicable Diseases. This really notable sanitary document embodies the most recent advances of public health science more completely than any similar set of regulations with which we are acquainted and offers convincing evidence of the wisdom of delegating powers of this sort to a small and expert body. The same principle of ordinance-framing by a small board is, of course, in force in most well-organized cities, but is a novelty in State health legislation.

Twenty-four diseases are listed as communicable, including, besides those which are reported everywhere, anthrax, dysentery (amœbic and bacillary), epidemic or streptococcus (septic) sore throat, German measles, ophthalmia neonatorum, paratyphoid, poliomyelitis, puerperal septicæmia and trachoma. On the other hand, cancer and pneumonia, which are reportable in some states and cities but which are not practically amenable to control by isolation are wisely omitted.

Physicians are required to report these diseases to the local health officers within twenty-four hours, the report to be by telephone or telegram when practicable and also in writing. Superintendents of hospitals, other institutions or dispensaries, teachers and school principals, proprietors or keepers of hotels, boarding or lodging houses, visiting nurses and public health nurses, persons in charge of labor or other camps, masters or persons in charge of vessels and persons in charge of farms or dairies, all have specific duties as to reporting laid upon them.

The sections of the Code prescribing how the diseases are to be handled after reporting are noteworthy for the clearness with which they emphasize the modern view that persons rather than things are the usual conveyors of infection, and the consequent stress upon individual isolation and the care of excreta rather than the vague gunshot quarantine of earlier days. In any disease except smallpox, if the person affected is properly isolated, other adult members of the family may continue their usual vocations, provided such vocations do not bring them into close contact with children. Terminal disinfection is required as a rule only "when deemed necessary by the local health officer" and appears along with Cleansing and Renovation as one of the three procedures which may be used separately or in combination at his discretion.

On the other hand, the rules governing the patient himself—the really dangerous factor—are correspondingly rigorous. The physician in charge is required on his first visit to give to the nurse or other person in attendance detailed instructions, conforming to the special rules and regulations of the

State Department of Health in regard to the disinfection and disposal of excreta in cholera, dysentery, paratyphoid fever and typhoid fever, and of the discharges from the nose, mouth and ears in diphtheria, cerebrospinal meningitis, epidemic or septic sore throat, measles, poliomyelitis, scarlet fever, smallpox and whooping cough. The local Health Officer is required to post the usual placards in cases of diphtheria, epidemic cerebrospinal meningitis, measles, poliomyelitis, scarlet fever, smallpox and typhus fever, and to furnish special circulars of information in these diseases and in epidemic or septic sore throat, typhoid fever and whooping cough as well. He must require proper isolation or removal to a hospital and may quarantine the entire household if neither of these alternatives is possible. The exposure of children and minors to diphtheria, measles, scarlet fever, smallpox, typhus fever or whooping cough is specifically prohibited, and children suffering from communicable disease or inmates of households which have been affected within fifteen days are to be excluded from schools and public and private gatherings. Minimum periods of isolation from persons suffering from the principal diseases are specified in the Code with maximum periods of incubation for those exposed, but the prolongation of isolation during convalescence and the shortening of isolation of exposed persons is left to the judgment of the local authority. A special section provides for the disinfection of the persons of patient and attendants throughout the course of the disease and at its close.

The State Department of Health is given power to formulate special rules and regulations for controlling carriers in cholera, bacillary dysentery, diphtheria, epidemic cerebrospinal meningitis, poliomyelitis and typhoid fever.

The sale of milk or other foods handled by or in any way exposed to persons affected with communicable disease is regulated by rigid ordinances.

The Public Health Council has power to amend this Code at any time it sees fit to do so, and no doubt additions and improvements will be made from time to time. Taken all in all, however, these sections so far established constitute an admirably progressive and rational formulation of the essential principles of present day sanitary science, so far as the control of communicable diseases is concerned. They have recently been published as Special Bulletin No. 2 of the New York State Department of Health, together with detailed regulations as to Cleansing and Disinfection during and after Communicable Disease. Both these sections of the Code and the Regulations are worthy of the careful study of city and State Health Officers the country over.

PULMONARY ANTHRACOSIS*—A COMMUNITY DISEASE.

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Definite observations upon the presence and nature of pigment within the lung substance and its associated lymphatic structures are of relatively recent date. Nevertheless, as early as 1717, Ramazzini discussed the presence of carbonaceous material within the lung and indicated an association with definite pulmonary diseases. His observations were made upon various laborers who, through the inhalation of angular stone particles, became predisposed to asthma and tuberculosis. His observations, however, did not suggest that any of the foreign material contained within the lung, consisted of a carbon deposit.

Not until Pearson in 1813 studied the problem and applied the term anthracosis or coal miner's lung, followed by a report by Laennec in 1819, was a more acute attention attracted to the subject. Pearson indicated that individual coal particles when inhaled became deposited in the lung tissue and upon the accumulation of larger quantities of this pigment, the lung gave macroscopic evidence of its presence.

This contention was further supported by Gregory, who in 1831, described the pigment in the lungs of a coal miner, with definite tissue changes within the organ. Other English authors (Thompson, Simpson, and Stratton) made similar observations and indicated the importance of anthracotic deposits as a type of occupational disease.

Although Pearson's views were accepted in England, they were strongly combatted in Germany, particularly by Koschlakoff, as well as by Virchow and Henele who regarded the coloring matter in the lung substance and in the lymph nodes of haematogenous origin. Virchow did not believe that the lung substance could be penetrated by inert foreign particles. As late as 1855, Barthelmess discussed "pulmonary melanosis" as a progressive pigmentation of the lung resulting from repeated hæmorrhages and inflammation. Subsequently, however, Pearson's observations were confirmed in Traube's clinic (1860) where some carbon pigment, presumably having its origin from charcoal, was demonstrated in the lung substance. Since then the deposition of carbon from smoke has been amply confirmed by studies upon human lungs as well as by animal experimentation. The first confirmatory animal experiments were carried out by Knauff (1867) and repeated by Konradi (1869).

*This research was carried on in conjunction with the "Smoke Investigation" of the Department of Industrial Research, University of Pittsburgh.

In the earlier discussion upon the inhalation of dust, including the carbon particles of smoke, it was indicated that as every one inhaled more or less of it during his life time, little pathological change, other than the storage of pigment, occurred in the lung tissue. It was, however, recognized that the inhalation of different foreign substances had a varying effect upon the respiratory organs. It was deemed that carbon pigment had the least harmful effect and hence, the deposits which were found in the adult lungs, could be disregarded as having any association with respiratory diseases or clinical symptoms during life.

With the admission that the black pigmentation of the lung was the result of the inhalation of carbon particles contained in the air, a considerable controversy began concerning the manner in which the foreign material made its entrance into the tissues. It was not uncommonly observed that the sputum of individuals working in smoky atmospheres would, for considerable periods of time, contain black pigment particles. Some of this foreign material was free, while some was contained within cells. Knauff believed that these cells were desquamated epithelial structures of the bronchi, which had lost their cilia. It was thought that with the active desquamation of the epithelial lining that a more ready access for the pigment to the deeper structures was possible. Sikorsky and Klein both believed that foreign particles were able to pass between the uninjured epithelial cells and directly enter the lymphatics.

On the other hand, Arnold and Schottelius opposed the view of the direct migration of the pigment into the tissues and claimed that the transport was accomplished only through the agency of cellular activity. This phagocytosis they believed could be accomplished by the bronchial epithelium, lymphoid wandering cells and by the alveolar epithelium. Traube thought that the acicular nature of the carbon particles would account for their tendency to pierce the delicate alveolar walls and then to migrate to other parts by the lymphatic channels. Rindfleisch accepted this latter view, laid stress upon the gritty hardness of the particles and believed that through the impact of the air current the particles may be driven through the superficial tissues. He furthermore pointed out that when these foreign particles had entered the lymph spaces they not uncommonly became incorporated within cells having phagocytic properties.

The theory of the phagocytic transport of the foreign particles continued to gain ground but there was no agreement concerning the nature of the active cell. Slavjansky and Ins believed that the leucocytes were most active, while Ruppert, Schottelius, and others believed that the alveolar epithelium picked up the carbon from the air sacs. Arnold was divided in his views, considering that both types of cells were capable of carrying out this function, while, furthermore, he believed that under certain conditions migration of pigment might occur in the absence of phagocytic

cells. Even to the present time, observers are not in unison concerning the taking up and storage of the pigment which reaches the lung. The exact nature of the phagocytic cells, and these seem to be the active participants in the accumulation of carbon pigment in the pulmonary structures, is still in debate. In a recent study, however, it appears to us that Haythorn has conclusively shown that although pigment may appear in a variety of cells, the important cell acting as a carrier from the air sac to the interstitial tissue and the lymphatics of the lung, is an endothelial cell.

Although, in the early days of cellular pathology (1858) the finding of extensive pulmonary anthracosis was unusual, the situation has changed much in the present day. Then as now, the most intense examples of pigmentation of the lung were found among the coal miners, and it was particularly to these that Pearson, just a century ago referred, when he first applied the name anthracosis to the pulmonary condition. Apparently, early in the last century, in the course of ordinary life the accumulation of pigmented dust bodies within the lung was hardly sufficient to attract the attention. At that time, the use of coal was less general among the housekeepers and the combustion of wood was relatively complete, with but slight pollution of the air. Then, too, coal was not in as general use in industries nor had the use of the steam engine found a definite place in manufacture.

Today, the use of coal forms the main source of energy for the remarkable industries which began in the middle of the nineteenth century. We need not indicate by figures or statistics the extent to which our progress is determined by the use of coal. Nor is it within our province to indicate, the enormous losses entailed in the incomplete combustion of coal. The main fact stands before us today that in every city where householders use coal or in which manufactures of any capacity are located, the air shows a greater or less pollution by carbon particles. Today, it is almost possible to gauge the extent of the manufactures within a city by estimating the quantity of carbon in the atmosphere. In other words, what, not so many years ago was a rather unusual aërial condition, today forms a constant finding and has added a nuisance which affects the well-being of the community. No longer may we regard the presence of carbon in the air of large cities as a harmless factor. And furthermore, the gradual accumulation of this foreign material within the respiratory tract has a definite effect upon the tissues in reducing their functional activity and in possibly leading to secondary disturbances affecting our general bodily health.

The following observations have been made upon a series of autopsies, in which the deposit of carbon pigment within the lungs was particularly noted. These observations were made upon civilians not engaged in coal-

mining. The majority of them had been residents of the Pittsburgh district for the greater part of their lives. We were unable to account for the great variation, which occurred in the intensity of the pigmentation among the different individuals, particularly when their respective occupations appear to have had no relation to the amount of the pigment deposit in the lungs. Thus one of the most markedly pigmented lungs was obtained from a peddler, in whose history we could find no particular association with a sooty atmosphere or industry. It is possible that the tissues of different individuals store the foreign particles from the air with different degrees of activity.

Admitting that but few individuals today can escape the accumulation of carbon particles in the respiratory system, it may be suggested that the condition should be looked upon as a normal process. This attitude has been the dominant one in the discussion of pulmonary anthracosis. As, however, we must today freely admit that individuals living under different circumstances and in different communities suffer unequally from the quantity of inhaled dust, it is impossible for us to designate all of these as normal conditions. That a small amount of anthracosis of the lungs is not incompatible with good health is obvious to all who have observed the condition in many autopsies. That, however, certain communities are subject to greater pollution of the air by smoke than others, and that the individuals in these communities suffer in an equally greater degree from the inhalation of soot and smoke is also obvious to those who have had an opportunity of comparing the lungs from different localities. The pathologist has no difficulty in recognizing lung specimens from large manufacturing cities.

Thus we are able to observe variations from the almost non-pigmented lung tissue obtained from those living far distant from cities, to the more intensely pigmented lungs, the coal miner's lung illustrating the extreme degree of carbon deposit. There is, however, some difference between the deeply pigmented coal miner's lung and that obtained from the city dweller. The carbon dust as inhaled in the coal mines is considerably coarser than the fine particles of soot found in the city air. Moreover, the dust in coal mines is made up of fine angular and rough particles, while soot is a mixture of a very fine amorphous carbon and ash.

ANATOMICAL CONSIDERATIONS.

The deposition of carbon pigment in the lungs from the dust-laden air is dependent upon the respiratory function and the activity of the lymphatics. The inhaled air with its carbon particles is carried to varying depths into the lung tissue. The major amount of the foreign material adheres to the moist walls of the respiratory passages and never reaches the lung tissue proper. It is possible, and microscopical analysis seems to

confirm this, that the foreign material that adheres to the mucus membranes of the nose, pharynx, trachea, and larger bronchi is but rarely carried into the tissues of these tracts, but lying in the secreted mucus, is carried upwards and is eventually expelled. The relatively lesser quantity of dust and carbon which reaches the lung alveoli also becomes adherent to the moist surfaces of the alveolar sacs and then by the activity of certain cells which have been studied and described by Haythorn, these particles are eventually carried into the lymphatics of the alveolar wall where they are disposed of by the lymphatic system of the part. The subsequent distribution is to a great extent determined by the site of absorption within the lung. Thus the carbon particles which have found their way into the air sacs near the surface of the lung, gradually accumulate within the lymphatics of the visceral pleura, while the carbon which is collected from the more centrally placed alveoli, accumulates about the lymphatic channels which drain that particular area. The tendency of this absorbed carbon is to pass from the finer lymphatic channels of the alveolar walls to the larger passages, eventually reaching a lymph node where the onward progress of the particles is impeded by the filtering action of this structure. In the main, the lymphatic drainage of the entire lung converges at the hilus and passes into the peri-bronchial glands located in this part.

The lymphatics of the visceral pleura form an intricate network, of channels which surround each lobule. The lymphatics upon the pleural surface of these lobules can, at times, be recognized by the naked eye. Many anastomoses occur and the larger channels drain towards the hilus. Communications between the surface lymphatics and those within the organ have also been demonstrated.

A somewhat similar system of lymphatic channels have been demonstrated about those lobules which lie within the lung. Not only is there a system of lymphatic channels about the lobules but small passages extend into the individual alveolar walls. Sikorsky, as well as Wittich claimed to have demonstrated small patent communications between the lymphatic channels in the alveolar walls and the air sacs. By this means, it was suggested, that foreign materials within the air sacs could find a ready passage into the interstitial lymphatic system. In 1878 Rindfleisch suggested similar passages for the entrance of coal pigment into the lung tissues. He believed that the fine dust particles could pass directly from the air sac into the interstitial lymphatic channels without the intervention of phagocytic cells. He did appreciate the rôle of phagocytosis in the subsequent transposition and storage of the foreign material. It would appear, however, with the more recent studies that the migration of the dust particles from the air sacs occurs only through the agency of certain wandering cells.

To thoroughly appreciate the progressive pigmentation of the lung

substance by the inhalation of carbon particles, the general mechanism of respiration, as well as the efficient lymphatic drainage of all the air sacs must be understood. The important conclusions of Beitzke and Most, that the lymphatics of the lung and visceral pleura have no direct communication with those of the head, neck, or abdomen, and the fact that carbon particles are rarely found in the circulating blood indicate that pulmonary anthracosis is developed through the activity of the respiratory functions alone. It is, therefore, quite out of place, here, to discuss the claims of Calmette, and his associates, for the origin of pulmonary anthracosis in the alimentary tract. A more extensive review and study of the relation of intestinal absorption to anthracosis is given by Montgomery. This author from his own experiments concluded that the respiratory route alone was the important one leading to pulmonary anthracosis.

DISTRIBUTION OF PIGMENT BENEATH THE VISCERAL PLEURA.

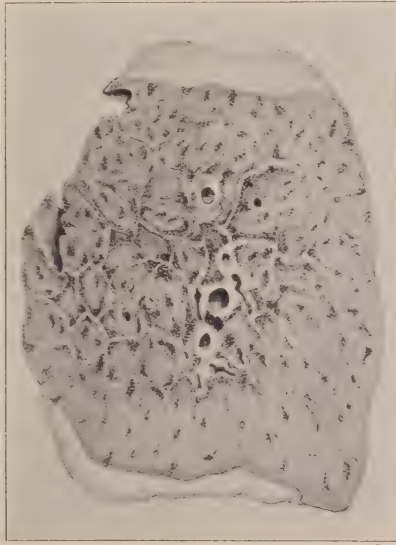
At first sight, when the lung is examined externally, the distribution of the deposit of carbon pigment seems to be irregular and without any association with the anatomical structure of the lung. The pigment is deposited in small granular masses, which, in their beginning, occupy areas less than of pin-head size. Sometimes it would appear that the deposit is in the nature of lines which, however, on slight magnification are found to be the coalescence of numerous small granular points.

As the deposit becomes more extensive, the pigment is found to follow a definite arrangement, and the anatomical structures which, in the non-pigmented lung are not visible, are mapped out by the deposit. Thus the sub-pleural pigmentation is found to pick out the septa dividing the lobules of the lung. This geographical marking is more particularly evident in the early stages of the pigmentation prior to the diffuse deposition of the pigment with the consequent obliteration of the early linear markings. Whereas in the early stages of the deposit, the septa of the lobules show fine linear deposits of pigment, the increasing accumulation of the carbon leads to an irregular thickness of these lines and the conversion of them into small chains of nodules or to the development of flat or shot-like masses in the sub-pleural tissues. Gradually the deposit extends from the septa into the tissues of the lobules until blotches of pigment become prominent. All gradations, from the finest hair-like lines in the septa, to diffuse pigmented areas in which the normal color of lung substance cannot be recognized, are not uncommonly seen in the same lung.

The macroscopic appearance of the sub-pleural tissues is a very good gauge as to the actual amount of carbon pigment contained in the lung. That is, with the deposit of such an obvious pigment no difficulty is experienced in distinguishing its presence or in gauging the amount present in each portion of the tissue examined. It is well, however, to recognize that the

amount of carbon pigment on the surface does not necessarily indicate the extent or distribution of the pigment in any part of the lung tissue. There are factors arising with each lung and within each lobe which tend to modify the amount of pigment within the tissue.

Although the pigment follows the septa of the lung lobules, the distribution upon the surface is by no means uniform. It has been repeatedly observed that the amount of pigment in the different lobes as well as in the different portions of the same lobe varies very considerably. The distribution of the pigment in the sub-pleural tissues is dependent upon the course of the lymphatic stream. But, as has been indicated by S. R.



Early Anthracotic Deposit along Interlobular Septa.

Haythorn, the presence of carbon pigment within the lung may have a marked effect upon the subsequent condition of these lymphatics. Thus, as we shall discuss later, the deposition of carbon pigment resulting through the activity of certain phagocytic cells has a tendency to stimulate tissue changes which modify the architecture of the organ. It is most probable that by this means the deposit occurring in the lung tissue does not always appear in the same characters but, according to the particular tissue reaction (fibrosis), a modification of the lymphatic system leads to an altered physiological process in which the amount of deposit may be increased or decreased.

In the examination of a series of lungs it soon becomes evident that there are certain areas in the normal organ, which become involved earlier than others, and which usually show the most intense pigmentation in the later

stages of the process. Thus in young adults who show no evidence of other diseased processes in the lung, the pigment is more prominent in the apex of the upper lobe, the anterior border of the upper lobe, and the posterior border of the upper and lower lobes. Even in these three areas the distribution of the pigment is by no means uniform, for in different individuals the grades of intensity of the deposit differ somewhat within these locations.

It is the usual observation that the least pigmented portions of the pleural surface of the lung are the diaphragmatic and the interlobar surfaces. It is not uncommon, however, to observe a sharp line of pigmentation separating the out surfaces of the pleura from the interlobar areas. At the border of each lobe, as it lies in apposition to its fellow, there is a marked pigmented zone, more intense than the deposit upon the free surface, and serving as a boundary between the pigmented pleura and the non-pigmented interlobar surfaces.

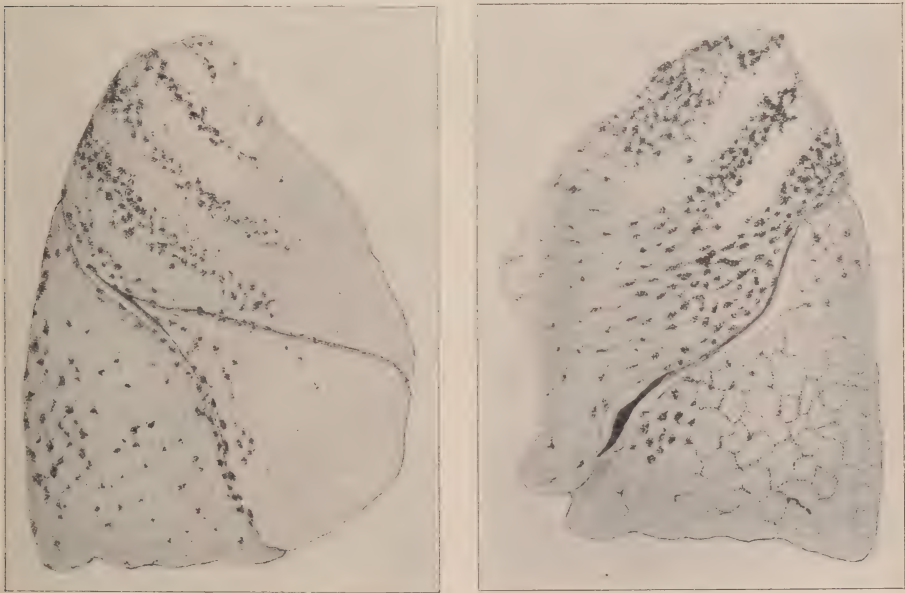
The distribution of pigment in the apex of the lung varies according to the shape of the part and to the character of the dome of the chest cavity. As has been pointed out by Schmorl it is not uncommon to have an unusual prominence of the upper ribs and irregular folds of the parietal pleura forming bands which divide the otherwise round dome of the chest cavity into several smaller compartments. These abnormal ridges are very common, but are not constant in their disposition. Not uncommonly they pass from behind inwards and forwards crossing the dome in an arched and rather spiral direction, the anterior extremity passing towards the hilus of the lung. At other times, folds of parietal pleura pass from behind upwards and forwards, crossing the highest points of the pleural sac. When these folds are marked, a definite depression is left upon the lung surface, particularly if the lung is unduly distended by emphysema or pneumonia. This depression is observed in the nature of a groove looking not unlike the vertical grooves seen over the right lobe of the liver (Liebermeister's groove). These grooves become more marked and more permanent with the age of the individual. Not only do they present depressions in the soft and spongy tissues of the organ, which, in the early years of life, can easily be obliterated, but in the course of years they remain as definite areas of retraction where the lung substance does not expand nor develop equally with the rest of the tissue. Thus in the apical grooves the lung tissue is inhibited in its growth and its functional activity is hindered by obstructing bands. Moreover, the lung tissue opposite the depths of the grooves is prone to become fibrosed or to develop adhesions to the parietal pleura.

These apical grooves are also to be recognized in the variation of the deposit of the pigment. The grooves when well marked attract the attention by showing a lessened amount of pigment than the surrounding tissue. When several well marked grooves occupy the apex of the lung,

then this part of the lobe appears to contain decidedly less pigment than other parts. Yet on closer examination, although the apical pleura may appear to contain less pigment than the other pleural areas, this is due to the absence of pigment in the grooves themselves, and not to the variation of pigment in the parenchyma of the lobe.

The ridges bounding these grooves usually show an unusual pigmentation. The extent, however, of the deposit on the borders of the grooves is not uniform in that it is not uncommon to observe one border deeply pigmented while its fellow on the opposite side contains but little carbon.

The intensity of the pigmentation along the posterior border of the upper



Non-Pigmented Rib Grooves of Lung.

and lower lobes is commonly the most marked in the entire organ. From the early beginning of a tortoise shell marking indicating the division of the lobules, the condition progresses until the pigmentation produces one diffuse coloration of the pleural tissues.

Furthermore, there are two important considerations respecting the localization of anthracotic pigment in the pleura. The first of these is the relation of the pigment deposit to the position of the intercostal spaces and the ribs. The second is the relation of the pigment deposit to the opposed pleural surfaces between the neighboring lobes.

In respect to the relation of the pigment to the ribs and intercostal spaces there have been a number of views expressed. As above stated,

our attention has been particularly attracted to this question through the observations of Schmorl upon the apical grooves of the lung. Similar rib impressions are found in adults upon the surfaces of both the upper and lower lobes. Schmorl in 1901 indicated that the uppermost ribs produced individual impressions upon the lung substance which were easily recognized at autopsy. Schmorl found these depressions in children, but noted that they tended to disappear with advancing age. He believed that the depressions were the result of the undeveloped chest pressing upon the lung substance and that with the development of the thorax, in the normal individual, the pressure upon the lung was much relieved. He noted, however, that in these individuals, whom we are prone to look upon as possessing the anatomical character of a tuberculous subject, the flat chest, these grooves or rib depressions upon the lung remained permanently. Thus he believed that the anatomical characteristics of the chest altered the relationship of the lung to the pleural cavity which in the undeveloped condition was prone to bring about those anatomical changes of the lung, inviting tuberculosis.

The grooves in the lung tissue had the effect of compressing both the lymphatic and blood vessels. Likewise a certain interference might be produced in compression of the bronchial tree. These pathological conditions tended towards a stasis of the circulation of the part, permitting a more ready development of the tuberculous process.

It has, furthermore, been shown that not only do the ribs in the uppermost portion of the thorax leave their impression on the lung tissue, but that such marks may be distinguished for the entire series of ribs down to the 8th or 9th. These rib markings or impressions are more readily followed by observing the deposit of pigment by the actual depressions produced upon the lung substance.

As one will readily appreciate, the intensity of the impressions of the ribs upon the lung varies in different individuals. Not uncommonly, the thorax is of such dimensions or its capacity bears such a relation to the lung, that little or no effect of rib pressure is to be noted. Under those conditions in which the volume and consistence of the lung is increased, as in lobar pneumonia, the rib depressions are temporarily more decidedly marked.

Peiser has studied a series of cases and finds that the rib grooves are not well marked in the infant. In this he differs from Schmorl. He believes that the rib grooves increase in their depth as the individual assumes the upright position and the thoracic wall sinks. As the thorax, with increasing age, gradually assumes its new level, the upper ribs become more prominent on the inner wall of the thorax. These then produce depressions upon the lung surface. Not only does the sinking of the thoracic wall lead to the prominence of the rib margins, but the respiratory movements

are altered, there being a diminished respiratory activity established. This in its turn has the effect of producing a pulmonary stasis and a lessened elasticity of the lung. Peiser believes that with the altered condition of the respiration, the character of the lung substance changes so that the rib grooves are more readily produced.

Further observations have recently been made by Orsos. He studied the mechanics of respiration as regards the relationship of the expanding thoracic wall to the spongy lung substance within. He indicates that the thorax, constituting a closed cavity, has its walls made up of parts which are of different composition. In part, the wall consists of solid structures, the ribs, while in other places soft portions make up a part of the active walls. He points out that the effect of these two types of tissue upon the lung substance is different. The solid ribs, he believes, are more active in producing a suction by the expanding chest and a compression by the contracting chest wall. This greater activity in relation to a part of the chest wall has its effect upon the lung substance in that the tissue immediately opposite the firm ribs is functionally more active during the respiratory movements. The inactivity of the intercostal spaces is not only to be observed in the smaller alveolar spaces, but also in the more sluggish lymphatic drainage leading to the greater deposition of the insoluble carbon particles. Thus in the adult, the intercostal spaces become more richly marked by the deposit of anthracotic materials.

In discussing the views expressed by Orsos, an opposite stand was taken by Marchand, Aschoff, and Beitzke, in that each of them expressed his belief that the greater deposit of pigment occurred in the areas mapped out by the ribs.

In our own observations, we must, in the main, agree with the finding of Orsos. Some difficulty is experienced in determining which portion of the lung lay opposite the ribs, particularly when there have been no marked depressions, while the deposit of pigment is quite decided. There can, however, be no doubt as to the depressions opposite the first, second, or third rib, and in these situations, the grooves which are very decided contain less pigment than the high points of the ridges. At this point, however, it is necessary to introduce a word of explanation in discussion of the pigment deposit in and about the costal grooves. It is best to study those lungs which are moderately advanced in the anthracotic process, and which are not altered by the presence of adhesions. Inflammation introduces a factor which modifies the normal distribution of pigment so that we can no longer ascribe our findings to the influence of the costal grooves alone. We shall discuss the effect of inflammation upon the deposit of coal pigment at another place.

It is, furthermore, to be indicated, that the deposit of pigment along the intercostal areas is not uniform. Although the margins of the grooves as

well as the intercostal spaces contain the greater amount of the pigment while the depth of the groove is almost always free, it is impossible to make a common statement as to the exact outline of the deposit for each groove. No doubt, the intensity of the pigmentation is determined to a certain extent, by the individual characters, such as the prominence of the ribs, the corresponding depth of the groove, and the local pressure upon the lymph and blood vessels.

In support of the views of Orsos that the cavity of the grooves exhibit less pigmentation than the surrounding portions, is the fact that the natural depression as well as the opposed pleural surfaces between the lobes have the same characters as the rib grooves in being less pigmented than other parts. It is the common observation to find a pale non-pigmented pleura on the interlobar surfaces while the external visceral pleura is mottled by a pigment deposit. The same is true of the diaphragmatic surface. Here, too, a less amount of pigment accumulates. This variation in the distribution of the pigment upon the pleural surfaces is not dependent upon the difference of the respiratory function of the lung alveoli beneath these parts, nor is it due to a difference in the character of the distribution of the lymphatic channels which surround the lung alveoli, but it is dependent upon outer influences of pressure which modify the capacity both of the alveoli and lymphatics. In the normal lung these influences of pressure are to be observed mainly in the rib grooves, the interlobar and diaphragmatic surfaces. It is possible that the presence of points of pressure upon the lung tissue has the quality of massaging the parts during respiratory activity and thus driving the particles of pigment more rapidly to other parts. We are inclined to believe that this quality of massaging the parts by intermittent friction plays the important rôle of preventing the accumulation of carbon pigment in the given regions of the lung. As we shall point out later, the lack of flow in the lymphatic system does not prevent the accumulation of foreign particles. Stasis of the lymphatic system, although preventing the fluid within the channels from flowing with normal rapidity has little effect upon the migration of the cellular elements, which are the main means by which the foreign material is transported. Thus, although stasis prevents the proper flow of the serum through the lymph channels, it permits the wandering of phagocytes into the obstructed region where these may accumulate in undue proportion. These wandering cells with their pigment burden are the chief causes for the pigmentation of the given areas of lung tissue.

INTERSTITIAL PULMONARY ANTHRACOSIS.

The nature of the distribution of carbon pigment in relation to the pulmonary alveoli within the lung is very similar to that observed upon the pleural surface. We do not, however, have an opportunity of viewing

the pigment in the same manner. Thus, in a cross section of the lung we do not have the opportunity of observing the surface of the lobules, but see only cross sections of the partitions. Thus for the most part our attention is attracted to the deposition of pigment at the points where the partitions meet. In these situations we observe small nodular deposits not uncommonly the size of pin-heads. At first sight, it would appear that the amount of pigment within the lung is relatively less than that observed on the surface. Nevertheless, it can be observed that the total amount of pigment within the lung tissue bears a relation to the quantity observed on the surface. In the normal lung, however, the distribution within the tissue is more uniform than the distribution of carbon in the pleura and there is not the macroscopic variation in different parts of the lobes, save at the hilus where the parenchyma is more pigmented on account of the greater accumulation in small lymphatic channels and nodes.

Furthermore, the unequal distribution of the pigment as it is observed upon the pleural surface has no direct relation to the deposition within the organ. The lack of pigment upon the interlobar surfaces and in the rib grooves is only a superficial condition and does not affect the deeper underlying lobules. The earliest deposits of coal pigment are to be looked for mainly in the perivascular lymphatics of the smaller branches of the pulmonary artery, subsequently, pigment appears in the regions of the small bronchi and venules. In all of these situations, its presence becomes more marked with the increasing quantities of soot that are constantly inhaled.

As the accumulations of pigment gradually increase, they not only form lines along the septa of the lobules and the vascular channels, but nodular collections appear at the points of junction of the various lymph channels, where small receptacula are formed. These nodules become so prominent that they are readily felt by the finger, and at times the course of the lymph channel can be detected by the feel.

Tissue changes may or may not accompany these larger depositions of pigment. In the majority of instances, however, a process of fibrosis, not accompanied by any inflammatory exudate, makes its appearance and surrounds each pigmentary nodule. These can be detected by the naked eye, while the larger ones which are short-like and gritty, are commonly spoken of as "anthracotic nodules."

In none of our specimens were we able to observe any uniform variation in the deposit of the anthracotic pigment within the lung of normal individuals. The greater quantity of pigment along the various channels has been indicated above but no unequal distribution of pigment has been observed which would in any way correspond to the unequal distribution beneath the pleura. True it is, however, that certain pathological processes

in the lung tissue may modify the distribution of the pigment to a very great degree. We have, however, failed to find any evidence of excessive deposit in the deep tissues at the apex of the upper lobe. In fact, in our experience, more pigment was found toward the hilus than at the periphery, regardless of the pleural distribution. Furthermore, the more marked areas of pigment deposit in the pleura are confined to this superficial layer and do not involve the underlying parts.

In several specimens of lungs from elderly individuals, who showed a moderate amount of emphysema in portions of the lobes near the surface, it was observed that an unequal distribution of the anthracotic pigment was present. Those lobules showing emphysema contained less pigment than elsewhere. This condition was not only apparent by the greater area occupied by the emphysematous tissues but was real, in indicating less carbon in the affected tissues. When such emphysematous areas occupy the surface alveoli, and when these lie upon the ridges of the costal markings, it is then found that the borders of the grooves contain less pigment than the surrounding areas. Thus the contention of Marchand and others that the ridges between the intercostal grooves accumulate less pigment may have its explanation in the presence of these emphysematous alveoli.

THE MODIFICATION OF ANTHRACOTIC DEPOSITS BY OTHER FACTORS.

It is evident, from what we have said, that every individual has a greater or less quantity of carbon accumulate in the lungs, and that this accumulation varies in the normal lung according to the amount of carbon in the inspired air. With advancing age, the quantity of pigment continues to increase until a relative standard for the community in which he resides is reached. This pigment in the normal lung becomes deposited, through the agency of phagocytic cells within the lymphatics and its particular location beneath the pleura of the lung, is dependent upon the distribution of the lymph channels and the relationship of the opposed pleural surfaces which varies to some extent in all individuals. The distribution within the normal lung substance, appears to be entirely determined by the circulation within the lymphatics.

Whereas, under normal conditions we may look for certain common features in the anthracotic deposits in the lungs, there are also pathological processes which bring about a modification of the deposit. Thus we find that certain disturbances within the lung tissue have an effect of inducing greater deposits of pigment within localized areas. And it is probable that this new condition of excessive pigment deposit brings about further changes instituting a vicious circle.

Local Pleural Inflammation.—It is not an infrequent observation to find a greater quantity of pigment in the immediate vicinity of a band of

pleural adhesions. By some it has been suggested that these adhesions are the result of the unusual deposit which leads to an excessive irritation in the surrounding tissues. When, however, we study the development of pleural adhesions we find that the fibrous bands in children show little or no difference in the deposit of pigment from other parts of the lung. With advancing age, however, the accumulation of carbon at the point of attachment of the adhesion to the lung becomes greater. A difference is noted too, in the character of the adhesions, for those which have only a superficial attachment and do not induce a fibrosis of the neighboring lung tissue, show less deposit. It is obvious that we must differentiate those pigmentary processes associated with primary pleural adhesions from those that we associated with primary lung disturbances (tuberculosis), in which adhesions may also be present. Of this latter type we shall speak again.

The best example of pleural adhesions for study, are those developing between two surfaces which are in constant frictional contact, as well as the bands of adhesions which sometimes follow fibrinous pleurisy in early life. Of the former type, we meet with adhesions at the apex arising from a rib groove which, under ordinary circumstances, is non-pigmented. Here a firm band of adhesion binds a portion of the lung to the chest wall. The fibrous band not alone attaches itself to the surface of the visceral pleura but bands of tissue enter to a greater or lesser extent the fibrous layer of the lung covering and the interstitial septa, and alveolar walls. The fibrosis spreads diffusely through the tissue surrounding the blood vessels and encroaches upon the loose tissue of the lymphatics. Some of the lymph channels become completely obliterated, others are altered in their course.

It is probable that some of these bands of adhesions develop without the presence of an acute process and like the presence of milk spots of the heart, induce a progressive fibrosis which alters the relationship of the surrounding tissues. The pleura with its vascular tissues is altered to a sclerosed structure in which the lymph channels are reduced to mere clefts. In this condition not only is there a stasis of the fluid within these channels but there is also a filtering out of the phagocytic cells which are constantly wandering from the alveoli towards the larger lymphatic system at the hilus. Gradually the accumulation of cells is sufficient to show the increased quantity of pigment within the part. It would appear, according to Haythorn, that these migrating cells may live for a considerable period with the pigment within their protoplasm. Other phagocytes probably liberate their contents which become deposited in the interstices of the fibrosed areas. It is probable that the liberated carbon remains in the clefts between the cells and does not enter fixed tissue cells.

If the opportunity for the absorption of carbon pigment from the alveoli

be great, then the accumulation of this foreign material in the vicinity of adhesions becomes very marked. Nodules are formed which are hard and encroach upon the lung tissue. The lung alveoli are surrounded by a progressive fibrosis containing much carbon. It is more than probable, that when such excessive quantities of pigment are deposited that these again act as irritants, inducing greater adhesions. We do not believe that the inhalation of carbon in the normal lung will induce pleural adhesions unless some other factor within or upon the lung acts as a primary exciting cause. We have, upon repeated occasions, observed the lungs of mill workers and coal miners in whom the lung tissue had become intensely black through carbon deposit without there being any evidence of pleural adhesions.

We have never observed that acute pleurisy altered the deposit of pigment in the pleura. It has been observed that in acute inflammatory processes where the lymphatic channels of the pleura are filled with migrating and phagocytic cells that a considerable amount of pigment may be removed from the pleura to other parts. The exact bearing which this inflammatory migration might have upon the total pigment content could not be determined. The changes, however, were insufficient to produce any difference in the amount of pigment to be noted by the naked eye.

On the other hand, the chronic processes of the pleura not uncommonly had an effect similar to that observed associated with individual tags of adhesions. In cases where there were universal fibrous adhesions, the effect was not observed in the quantity of pigment deposit except where denser bands had developed. The diffuse and veil-like adhesions were without change in the vicinity of their attachment to the lung. A study of these indicated that the fibrous tissue of these adhesions had only a superficial attachment and did not involve the deep layer of the pleura. Where, however, the intensity of the chronic adhesive pleurisy was not uniform and where irregular bands were attached to the lung substance at various points, a more marked pigment deposit was prone to form.

In all instances where the more intense deposit of carbon pigment was associated with bands of adhesions, the process remained fairly superficial and localized. There was no invasion of the deeper parts by the continuous accumulation of pigment.

Inflammation of the Lung Substance.—Much has been indicated to associate pneumoconiosis with acute and chronic respiratory diseases. As early as 1717, Ramazzini drew attention to certain air-borne occupational diseases, and since then the greatest attention has been paid to diseases associated with inhalation of dust. Naturally, much interest has centered about the effect of inhaled dust of various kinds upon the lung and more particularly the relation, if any, that existed between these changes brought about by the deposits and inflammatory processes induced by bacteria.

The manner in which this relationship was established has not been entirely clear. By many (Ascher and others), however, tuberculosis has been looked upon as a process secondary to the deposition of the dust.

On the other hand, the relative infrequency of pulmonary tuberculosis amongst those who are engaged in work associated with much coal dust, has been pointed out by a number of authors (Ogle, Sommerfeld, Hirt). In the statistics, tuberculosis appears rather rare among coal miners. It would, therefore, appear that the inhalation of coal dust does not predispose to tuberculosis. The explanation for this appears to depend upon the morphological characters of the dust particles. On the other hand, Kuborn, Villaret, Versois, and others believe that the continued contact with coal dust leads to a true immunity against tuberculosis. Racine believed that coal contains substances which are antiseptic and disinfectant, and that this quality inhibits the growth of the tubercle bacilli, and Holman has shown similar disinfectant qualities in soot. Another (Idel) believed that the porous coal dust absorbed the tubercle bacilli and rendered them inert, while Wainwright and Nichols thought the partially soluble calcium salts contained within the coal gave the animal body protection against these organisms. The indication that the presence of coal dust within lungs had a favorable effect upon respiratory diseases, led Guillot to use the inhalation of coal dust for therapeutic purposes. As early as 1793 Beddoes established a sanitarium near Bristol where he treated chronic diseases, as asthma and consumption, by the inhalation of charcoal. The patients were placed in a dusting box where by mechanical means the charcoal was distributed into the air. However, it was later shown by Papasotiriu that coal dust had no influence upon the growth of the tubercle bacilli upon glycerine agar cultures, while Cornet was unable to protect animals against air borne tuberculosis by means of the inhalation of carbon dust. It has been indicated by Bartel and Neuman that anthracosis increases the virulence of tuberculosis in experimental animal infection.

It is more than probable that the infrequent presence of tuberculosis amongst those developing extensive anthracosis has its explanation in certain anatomical changes in the respiratory system, and it is possible, as is indicated by Fraenkel and admitted by Racine, Wainwright and Nichols, that the infrequency of progressive tuberculosis among the coal miners is due to tissue obstruction of the lymphatic channels brought about by the anthracosis.

Ascher's observations that the extensive inhalation of smoke as well as soft coal increases the mortality in tuberculosis, is not in agreement with other general findings. It has, however, been shown by Hart that there is a difference in the composition of smoke particles and coal dust, and that the former contains some of the products of coal distillation. Again it has been shown by others that laborers engaged in atmospheres containing

much coal dust, such as stokers, coal heavers, and chimney sweeps, are just as immune as coal miners to tuberculosis (Markel, Versois). Lewin found that 92.3 per cent. of chimney sweeps who had followed this occupation for more than ten years were free from respiratory diseases.

Our own observations have concerned themselves in determining the influence of the pigment upon the lung tissue as well as its relation to the tissue changes in acute and chronic processes within the lung. We can offer no statistics which show the relation which the pigment deposit has to the occurrence of infections of the lung. This study also deals with the effect of certain respiratory diseases upon the subsequent deposition of carbon pigment.

As it has been shown that the anthracotic material owes its presence to the activity of certain phagocytic cells, it is evident that an interesting problem confronts us in determining what rôle similar cells stirred to activity by a bacterial irritant will have upon the foreign materials, as carbon pigment, which are already present in the interstitial tissues.

In the study of lung tissues showing acute pneumonia, one is confronted with the picture of a lesser pigmentation in the areas involved in the pneumonia. The appearance is quite decided, and a fairly sharp line of demarcation separates the pneumonic area from the more healthy tissues. Within the consolidated portion of the lung the carbon pigment is seen only in the more prominent nodular deposits, while the pigment observed along the interlobular septa in the normal lung can no longer be traced. The diffuse pigmentary deposit in the alveolar walls is also overshadowed by the color of the exudate, be this grey or red. However, when viewing the lung from its pleural surface, no change in the amount of pigment deposit is observed in the superficial portions.

Although a decided diminution of pigment within the consolidated area is apparent, the fact that pigment is actually removed from the tissue involved in the inflammatory process can not be demonstrated in the lung after its recovery from pneumonia. We have not been able to define the areas of consolidation after recovery from the disease, by the amount of pigment in the tissues.

It does seem, however, that some of the pigment in the lung tissue becomes dislodged during the active migration of cells. During the late stages of pneumonia, the lymphatic channels contain a greater number of pigment-bearing cells than are observed in the uninvolved lung. It may be that, due to the stagnation of the lymphatic system in anthracosis, these pigment bearing cells do not have an opportunity of migrating from the pulmonary structures but remain stagnant in the dilated lymph channels. The macroscopic appearances of a diminution of carbon pigment during the acute stages of the pneumonic process is more apparent than real, and

is due to the overshadowing of the normal lung structures by the cellular exudate of the inflammation.

On the other hand, we have repeatedly observed that in isolated areas of fibrosis of the lung where no evidence of tuberculosis was found that the amount of anthracotic pigment was much increased over that present elsewhere in the same lung. We can, however, hardly offer this as an indication that the sequel to an acute inflammatory process, ending in fibrosis is associated with an excessive pigmentary deposit. In a single case of well advanced organized pneumonia we observed some increase in the the amount of macroscopic pigmentation within the fibrosed area, as well as microscopic evidence of such increased deposit. Naturally, it is difficult to estimate the exact variations from the normal deposit in different parts of the same lung.

In no instance has the examination of pneumonic lungs shown that the presence of the anthracotic deposit has, in any way, modified the distribution of the acute process. It cannot be shown that the more intensely pigmented tissues are more readily subject to pneumonia than the other less involved areas. It has, however, been suggested by Haythorn that aside from the local pigmentation in the vicinity of the individual air sacs, the anthracotic process of the lung has a definite effect upon the lymphatic system and particularly the lymphatic channels. These channels which become narrowed and partly obstructed, are less efficient for carrying off the débris which accumulates in the acute inflammatory process. This stagnation impairs the process of resolution with the result that proper repair of the lung following pneumonia does not take place. Conditions of unresolved pneumonia and gangrene of lung are more common in lungs with marked anthracosis than in the less affected organs.

We have in many examples made observations upon the anatomical relationship between the anthracotic deposit and tuberculosis. It is immediately apparent that in the discussion of such a relationship we must clearly define the type of tuberculosis. Naturally, the effect of the distribution of the tuberculous process upon the anthracotic deposit will be different in acute miliary tuberculosis than in chronic localized tuberculous lesions, and similarly the reverse relationship, if such exists, will also differ with the various forms in which one meets the tuberculous process. Individually, both processes are dependent, for their local distribution, upon similar factors, the phagocytic activity of cells and the distribution of the lymphatics.

We have not been able to observe any direct bearing of the anthracotic process upon acute miliary tuberculosis, nor have we observed a greater tendency for the development of tuberculous lesions in the anthracotic areas than in other parts of the lung. In fact, lungs showing moderate anthracosis will have more acute miliary tubercles in the uninvolved por-

tions of the lung than in the anthracotic nodules. Nevertheless, we have observed that in the later stages of the process when the miliary tubercles had advanced to larger and more definite caseating areas that the localized areas of anthracosis not infrequently had gray tuberculous centers. It is probable, therefore, that the absence of tubercles within anthracotic nodules during the acute stage of the infection is, in part, due to the intense pigmentation obliterating the early tuberculous focus. As the anthracotic deposit is associated directly with the course of the lymphatic streams and particularly with those surrounding the blood vessels, it is to be expected from what we know of the distribution of tuberculosis that many tubercles



Anthracosis of Lung about a Tuberculous Focus.

will develop along these systems, in spite of the presence of anthracosis. As the individual miliary tuberculous foci increase in size they gradually obliterate the anthracotic areas with the change from an intensely pigmented tissue to one showing numerous gray nodules of various sizes. With the increase in number, the tissue gradually loses the intensity of its pigmented appearance.

A still more marked loss of anthracotic pigment from the lung is seen in caseous pneumonia. Here, instead of having many small gray nodules gradually obliterating the pigment within the lung, we observe a diffuse gray caseous tissue whose light color is in strong contrast to the pigment in other portions of the lung. Only a moderate amount of pigment deposit is seen in the caseous area, and this pigment lies in the areas of former

intense deposit. The grey color of the caseous areas not only represents the necrotic exudate within the alveoli but also indicates tissue changes, first proliferative, later degenerative, of the alveolar walls and their contents. It is during the process of proliferation in the alveolar walls and lung trabeculae that the former pigmented cells are stimulated to proliferation and probably migration which leads to a removal of the pigment in the particular area. What eventually becomes of the disturbed pigment in the lung tissue during the tuberculous process is difficult to say. In part, it finds its way towards the lymphatics at the hilus of the lung. In part, it may become removed by the destruction of the tissue and subsequent expectoration.

In the above processes, acute miliary tuberculosis and caseous pneumonia, it is evident that anthracotic process has no influence in localizing the infection. We have, however, observed that miliary tuberculosis is more prone to develop into a chronic caseous miliary form in lungs presenting much pigmentation than in those not affected.

Quite a different outcome is observed in localized chronic caseous tuberculous foci. The early stages of the tuberculous process simulates the lesions which we have just described. As the lesion enters the chronic stage one observes that instead of there being a diminution of pigment in the involved area, that gradually, and in direct proportion to the amount of fibrosis, the pigment deposit increases. Thus the periphery of the lesion, in which area the healing of the tuberculous mass is taking place, larger amounts of pigment are continuously laid down. We have never observed the macroscopic increase of pigment before the development of fibrosis in the lesion. Eventually the fibrosed mass becomes intensely black, and hard. These areas vary in size from a pea to a mass the size of a golf ball. When fully developed, the tissue with its pigment deposit resembles in consistency and color a hard rubber ball.

We have observed all stages of these pigmented masses surrounding tuberculous foci and it is evident that the pigment deposit develops upon the tuberculous lesion. The extent of the pigmented area is entirely dependent upon the reaction in the tissue of the tuberculous focus, and this reaction is always of the development of fibrosis. Where a tuberculous process by progressive caseation has led to cavity formation, there is no excessive pigmentation in the vicinity of the cavity until repair by fibrosis has begun in its walls.

Microscopically, it has been shown that the same cells which form the tubercle and which in themselves are phagocytic for tubercle bacilli, are also the cells most phagocytic for carbon pigment. Thus these cells constituting the tubercle are adapted for the localization of foreign dust particles, and being in excess of the number present in the normal parts of the lung may bring about an anthracotic deposit, with the tubercle. However, by

the time the pigment has accumulated in sufficiently large quantities to be recognized macroscopically, there has developed a secondary fibrosis inducing a vicious circle by obstructing new lymphatics and accumulating greater numbers of pigment laden cells.

Tissue Changes Induced by Carbon Pigment Within the Lung.—Today we have come to recognize that the term anthracosis does not refer alone to the presence of coal pigment within the lung, but also includes the tissue changes which accompany this deposit. As we have previously indicated we have come to recognize that the deposition of the carbon in the lung is brought about through the agency of phagocytic cells. It is not probable that inert carbon can enter the lung tissues by mechanical means alone. The contention of Klein, Sikorsky, Merkel and others that the physical characters of the foreign material is such that it may migrate between the cells in the alveolar walls without the assistance of wandering cells can no longer be supported. Hence it is evident that the very process of accumulating and carrying the pigment is a vital one, and has to do with the cells arising from the pulmonary tissues. It has been shown that the number of cells acting as phagocytes found within the alveoli is proportionate to the quantity of pigment in the air sac and thus, too, the activity of the wandering cells is dependent upon the inhaled carbon. As the engulfed pigment is prone to remain fixed for considerable periods of time, it even being claimed by some that the phagocytized pigment remains permanently within the wandering cells, there is a progressive accumulation of these cells in the lymph spaces of the alveolar walls. Their direction is mainly towards the larger lymphatic system at the hilus of the lung, but it is also probable that these cells may not only lie inactive for varying periods of time, within the interstitial lymph spaces, but are still capable of returning to the air sacs to encumber themselves with still more foreign material.

How long these cells of an endothelial type are able to remain dormant but still living, is very difficult to say, yet it has been demonstrated in tissues that pigmented cells having every appearance of fixed connective tissue when thoroughly analyzed and segregated from their surroundings were found to be endothelial cells.

It is the common observation to find a progressive accumulation of pigment bearing cells within the alveolar walls with advancing ages. As the cells increase in number within the lymph spaces the wall becomes thicker and the tissue has a more or less hyaline appearance between the aggregations of pigment granules. To a certain extent the increase in tissue is the result of a direct increase in the number of wandering cells. On the other hand, we have also been able to show that there is a definite increase in the connective tissues about the lymph channels with the laying down of heavy collagen strands.

With this fibrosis there is no increase in the elastic tissue; in fact, the areas of extensive change are poorer in elastic fibers than normal.

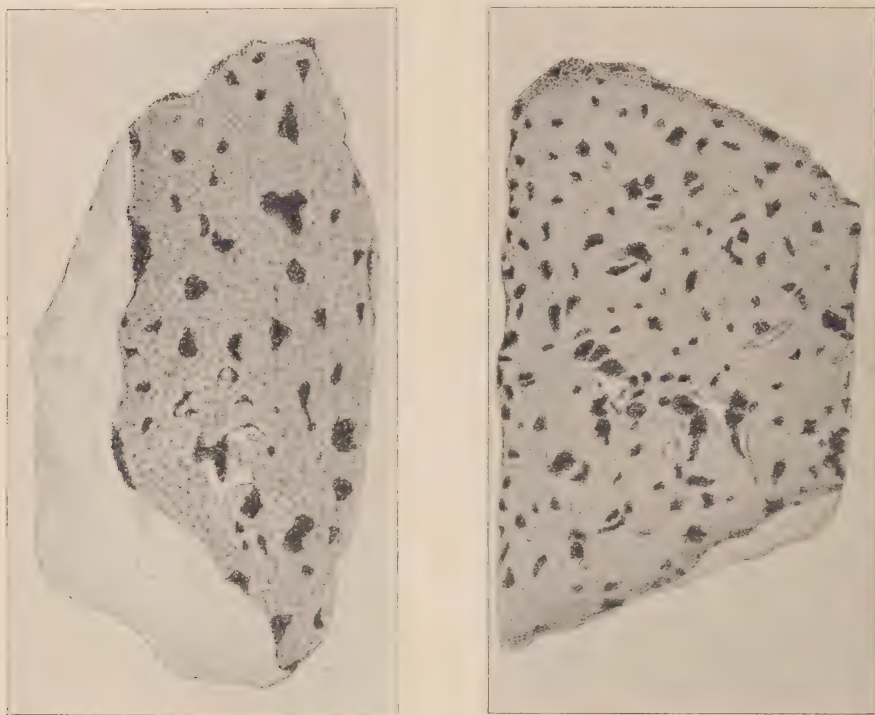
As we have previously indicated, the distribution of the inhaled dust in the lung is quite uniform, save for its distribution in the lymphatics of the pleura. Some (Arnold and also Boer) maintain that the deposition of soot is considerably greater in the upper lobe. This has not been our finding, though at times a difference has been observed between the two lungs. The accumulation of dust to that extent which induces secondary fibrosis will thus give rise to a fairly uniform tissue change in all lobes of the lung. This is a common finding inasfar as the lung tissue proper is concerned. It is probable that the fibrosis thus produced assists further with preventing a proper lymphatic circulation (Haythorn) and leads to the greater number of phagocytic cells becoming localized in the alveolar walls.

It is probable that the very nature of the phagocytic cells, being large and sluggish in activity, leads to their more ready localization in the lymph clefts than the more active leucocytes which deal with acute disturbances. If the normal functions of the endothelial phagocytic cells would be continuously carried out, it is improbable that as great a quantity of carbon would localize in the parenchymatous tissue of the lung, more of it finding its way to the large lymphatics and lymph glands at the hilus. The very condition which is brought about by the obstruction of the lymph clefts and small channels as well as the blocking of the lymph sinuses in the nodes about the bronchi tends to increase the localization of the large phagocytes close to the alveoli from which they obtain their pigment. Thus the nature of the pigment phagocytosis and the localization within the lymphatic spaces tends to bring about a vicious circle which, when a certain degree of anthracosis has developed, permits of a still more rapid deposit of pigment in the alveolar walls. It is about in this stage of the condition that the developing fibrosis leads to structural changes which impair the function of the lung tissue.

Other than inducing a diffuse fibrosis within the lung, there are also the nodular fibrotic masses surrounding accumulations of pigment bearing cells at the junction of the lymphatic channels. The more common of these are the size of wheat grains. The fibrosis assumes a concentric arrangement enclosing pigment which to a great extent lies free, but much of which is contained in the original phagocytic elements. Such nodules, however, may become much larger, forming isolated masses, three or four centimeters in diameter. It is probable, however, that these larger masses arising in the lung tissue have had other factors superadded, leading to their unusual development. The consistence of these is that of hard black rubber. Where calcareous masses are found in the center of such nodules, the previous existence of tuberculosis is strongly suggested. This asso-

ciation of anthracosis with chronic tuberculosis we have discussed above.

Anthracosis and Emphysema.—With extensive and diffuse development of pulmonary anthracosis in which tissue changes to a greater or less degree are developing, the activity of certain parts of the lung is impaired to such a degree that compensatory changes occur in other and more active parts. These compensatory changes are mainly evidenced in the development of emphysema. It would be difficult to indicate the se-



Nodular Dissemination of Anthracosis.

quence of events in laborers or coal miners. Here, from the very nature of their work emphysema would readily occur. We may, however, observe emphysema in individuals with diffuse anthracosis whose work or whose thoracic condition would offer no explanation, for the compensatory expansion of certain lung areas. This we have on several occasions observed, and we were unable to find an explanation save in the diminished functional activity in those portions of the lung with marked anthracosis and fibrosis. The development of the emphysema observed in the positions is seen under other conditions.

The apex and the anterior border of the upper lobe are usually most involved. A rather remarkable feature associated with this emphysema is the disappearance of the anthracotic pigment from the emphysematous area. Where the alveoli become usually distended the pigment gradually disappears until the tissues look quite white (pulmonary albinism). This has been commented upon by Beitzke and others.

From our observations it would appear that this loss of pigment from the lung is the result of the greater local activity during the process of development of the emphysematous areas. The condition would simulate the lack of pigment observed in the interlobar pleura where the massage of these areas by constant friction seems to drive the pigment bearing cells into the larger lymphatics. This is probably also the case during the development of the emphysema where the lung alveoli are acted upon by the greater air pressure having the effect of repeated compression and relaxation. Thus the air contained within the alveoli has the effect of massaging the alveolar walls and likewise of driving onward the cells containing the pigment. A similar effect would also be had upon the free pigment within the lymphatic spaces of the alveolar wall. In these emphysematous areas the removal of the pigment is not associated with an inflammatory process assisted by active leucocytic phagocytes.

QUANTITATIVE ESTIMATION OF CARBON IN LUNG.

As we have indicated, a fair estimate for comparison can be made of the carbon deposit by the naked eye appearance. The pleural deposit of carbon, although not directly related to the presence of pigment in the inner portions of the lung, is nevertheless, a good guide to the quantity of foreign material in the organ. The pale grey or greyish-pink color of the lung of the rural inhabitant is readily distinguished from the mottled, streaked or slaty black tissues of the city dweller. Moreover, as we have indicated, the progressive increase of the carbon deposit, in the lung of every citizen in manufacturing communities, can be recognized and grouped into the age periods by decades, when the individual has lived fairly constantly in the same district. Individuals of similar occupation are exposed to relatively equal amounts of atmospheric carbon, and their respiratory tissues receive similar quantities of carbon by inhalation. On the other hand, in communities where within short ranges of distance the atmospheric conditions differ, and with this the carbon content of the air is very unequal, the people living or working but short distances apart are subjected to diverse conditions, the one inhaling much larger quantities of soot than the other.

There are so many factors associated with the deposit of soot in the lungs of human individuals that it is impossible to make any general statement

indicating the amounts for each. In truth, it is plain that those in smoky atmospheres have larger deposits, but we are often misled in our reference as to occupational influence. The millworker employed within the sheds in the manufacture of steel is often less exposed than his wife living within a quarter-mile range enveloped by the smoke clouds from the multitudinous stacks. The lungs of a peddler selling his wares to the foreign population of our smoke-laden valleys were found to contain more carbon than those of the millhand (see table, page 914).

As we feel convinced, from our observations, that the intestinal route has little or no practical significance for the deposit of carbon in the lungs, it does not appear that the degree of cleanliness, particularly of the mouth, bears any relation to pulmonary anthracosis. Carbon particles once lodging upon the moist surfaces of the nose, mouth, pharynx, and trachea, never assist in increasing the carbon of the lung. It is probable, as was shown by Haythorn's experiments, that only those carbon particles lying within the alveolar sacs can reach a permanent interstitial abode and that little if any carbon is phagocyted and carried into the tissues from the bronchi or bronchioles. Furthermore, it would appear, both from experimental and other observations, that the carbon reaching the lung alveoli is only a very small portion of the carbon content of the air as inspired, and this portion has reached the lung because it escaped contact with the moist mucous surfaces of the respiratory tract. Under the most trying circumstances of a smoky atmosphere we are amply protected by the sticky surfaces of tortuous tubes.

Difficult as it seems for carbon to reach the lungs, it appears equally difficult to dislodge the pigment when once it has been incorporated by the tissues. In fact, we may well believe that save under very abnormal circumstances, carbon once within lung tissue remains for life, and hence each year we add that amount to our store as we may have been exposed to city smokes. To gain some accurate information of the quantitative deposit of carbon in the lungs an analysis was made of the tissues. Previous analyses have been made determining the quantity of iron, silicate, copper, and other metallic deposits in the lungs of laborers.

Saito, in a series of experiments, estimated the quantity of dust inhaled from the air. Using measured quantities of dust (white lead), he determined the quantity taken up by the animal when exposed to the dust-laden air. He observed that only 4 to 24 per cent. of dust entering the nose was deposited in the respiratory organs, while the remaining quantity found its way to the intestine.

More recently Boer has made a relative quantitative estimation of the soot content of small portions of lung tissue. By his method, using only three cubic centimeters of lung tissue errors of calculation may possibly be great. He points out the error which would be obtained in comparing

lung tissue of unequal density or consistence, as for example that of emphysema or œdema, and confined his examination to normal lung tissue. Here too much variation may be encountered, whether or not much pigmented pleura is included in the portion under examination. Care in selection of the tissue can not wholly rule out errors of serious import in the results. Furthermore, as the amount of carbon in these small portions of tissue was too small to weigh, he has used a colorimetric method suggested by Liefmann. The amount of carbon isolated from the lung examples was suspended in a mixture of oil and ether, and compared with a set of standard suspensions, prepared by suspending weighed quantities of naphthalin soot in the same vehicle. Such a colorimetric method cannot be relied upon, owing to the difference in the nature of the carbon in the lungs and naphthalin soot. Fresh soot has physical and chemical properties widely different from the carbon isolated from the lung by treatment with antiformin and alcohol. Isolated carbon from lungs has lost its flakiness and is quite granular, devoid of its phenols and acids. Its bulk is much less than the original soot from which it was derived, and in suspensions taken weight for weight it does not compare with the apparent mass of soot. It is, furthermore, to be noted that in isolating the lung carbon, care must be taken to free the final product of its fat and foreign calcareous matter which tends to remain incorporated in the residue.

In our determinations we took an entire lung, dissected the glands, large bronchi and adventitious tissue at the hilus, and minced the entire organ in a meat machine. The pulp was then divided among four half-liter flasks and to each was added enough of a 75 per cent. solution of antiformin to well fill the flask. The flasks were placed in the incubator and repeatedly shaken for four to six days. Two hundred cubic centimeters of alcohol were then added to each flask and the mixture centrifugalized, the residue being collected and returned to clean flasks. These materials were again subject to fresh digestion with antiformin for a period of four days, recollected, washed and for a third time acted upon by antiformin. After again collecting the residue and washing it, it was treated with 10 per cent. hydrochloric acid, repeatedly agitated and allowed to remain in contact for forty-eight hours. The residue now collected by the centrifuge and washed was in turn treated with acid-alcohol and ether until the supernatant fluid showed no evidence of fat. The ether suspension was then allowed to evaporate to dryness, and the collected residue repeatedly washed with distilled water to rid it of any contained salts. The final product consisted of a pure black, fine powder, denser than the light, fluffy soot masses found in the air. Under the microscope, angular carbon particles were alone present.

Case.	Age.	Occupation.	Residence.	Side.	Quantity of Carbon.
218	22	Laborer	Pittsburgh	Right	3.2
73	28	Peddler	Pittsburgh	Left	5.3
154	37	Laborer	Pittsburgh (6 yrs.)	Right	1.7
163	37	Housekeeper	Pittsburgh	Right	2.1
158	39	Clerk	Pittsburgh	Left	1.2
164	44	Housekeeper	Pittsburgh	Right	2.6
A-Q-8	47	Storekeeper	Ann Arbor	Right	0.145
A-Q-12	68	Laborer	Ann Arbor	Right	0.405
239	69	Carpenter	Pittsburgh	Right	2.81

I am indebted to Prof. A. S. Warthin for the material from Ann Arbor.

In our examination it is shown that the lungs of adult individuals resident in the Pittsburgh district have materially more carbon deposit than the lungs of the two individuals resident in a lesser manufacturing community. Our number for comparison is very small, but is, nevertheless, suggestive of community characteristics. On account of the slow and rather tedious process in isolating the carbon in a pure form, only one lung was examined in each case, so that the total pulmonary content is about double that indicated in the table. Furthermore, it is to be noted that the isolation of the carbon did not include that present in the peri-bronchial glands, where dense deposits are commonly found.

As was previously indicated, the lungs showing marked anthracosis are decidedly heavier than normal organs, but it must not be inferred that the extra weight is due to the foreign dust in the lungs. From our analysis of the carbon pigment in the lung it is evident that no material increase in weight is obtained directly from this source. On the other hand, it is well shown that a relatively small quantity of carbon in the lung can induce massive fibroid changes which alter the architecture and increase the bulk.

SUMMARY.

Pulmonary anthracosis (not in coal miners) is distinctly an urban disease, and is proportionate to the smoke content of the air.

The soot is inspired and lodges in the pulmonary alveoli, from which it is carried by phagocytes into the lung tissue to become lodged in some portion of the pulmonary lymphatic system.

Although small quantities of carbon deposit in the lung may remain without harm, yet the quantity accumulating in the dweller of the larger cities has an accompanying greater or less fibrosis impairing the elasticity as well as altering the functional capacity of the organ.

The distribution of carbon is fairly uniform in the parenchyma of the different lobes, but there is a considerable variation in the distribution of the pleural deposit. The interlobar and diaphragmatic pleural surfaces show the least pigment. Moreover, less pigment is found in the grooves produced by the ribs or abnormal bands.

Carbon tends to accumulate at the nodal points of junction of the lymphatic channels. The cellular migration of carbon may lead to unusual accumulations in certain areas particularly well demonstrated in the deposit about chronic tuberculous lesions.

Carbon deposits by inducing fibrosis tend to encapsulate chronic tuberculous foci.

Pulmonary anthracosis by itself does not appear to stimulate the production of pleural adhesions.

The actual amount of carbon present in the lungs of different individuals varies considerably and is dependent, in part at least, on the age, occupation, residence and condition of the lungs (emphysema, collapse, tuberculosis).

I am much indebted to Miss May E. Bothwell for the drawings and for assistance during the progress of the work.

BIBLIOGRAPHY.

- Ascher: Der Einfluss des Rauches auf die Atmungsorgane: Stuttgart. 1905.
- Aschoff: Sitzungs der. d. Ges. z. Beforder d. ges. Naturwissensch zu Marburg. 1906.
- Idem*: Verhand. d. d. Path. Gesell. 1912. xv. p. 148.
- Idem*: Path. Anatomie. 1909. Jena 11. p. 271.
- Arnold: Untersuchungen uber Staubinhalation und Staubmetastase. Leipzig. 1885.
- Barthelmess: Inaug. Disert. Erlangen. 1885.
- Beck: Uber Veraenderungen der Lunge. Wurzburg. 1895.
- Beitzke: Anthracosis. Virchows Archiv. 1907. 187. p. 183.
- Idem*: Verhand. d. d. Path. Gesell. 1912. xv. p. 148.
- Bartel: Weiner Klin. Wochensch. 1895. x. p. 10.
- Bennecke: Beitrage zur Klinik der Tuberculose. 1906. vol. vi. p. 139.
- Boer: Arch. of Hygiene. 1911. vol. 74. p. 73.
- Calmette and Guerin: Annales de l'Institut Pasteur. 1905. xix. p. 601.
- Cornet: Die Tuberculose. Nathnagels Handbuch. 1899. p. 240.
- Fraenkel: Deutsch. med. Wochensch. 1895. x. p. 10.
- Gregory; Edinburg Med. & Surg. Jour. 1831. xxxvi. p. 389.
- Guillet: Archiv. gener. de Medicin. 1845. vol. vii. p. 1.
- Haythorn: Journ. Med. Research. 1913. vol. xxix. p. 259.
- Henele: ref. Beck. Inaug. Dissert. Wurzburg, 1895.
- Hirt: Die Krankheiten der Arbeiter. 1871. Breslau.
- Holman: Amer. Journ. Public Health. 1913. iii. p. 1210.
- Hart: Lubarsch Ostertag. 1910, Abt. 1. p. 405.
- Ins: Archiv. f. expl. Path. 1876.
- Idel: Inaug. Diss. Wurtzbrug. 1889.
- Koschlakoff: irchows Archiv. 1886. Bd. 35.
- Knauff: Virchows Archiv. 1878. Bd. 73.

- Konradi: Untersuchungen über den Schwarzen Farbstoff in Lunge. Dorpat. 1869.
 Kuborn: Presse. Medic. 1862. No. 27.
 Lewin: Die Inhalationstherapie. Berlin. 1865.
 Montgomery: Jour. Med. Research. 1910. xxxiii. p. 3.
 Marchand: Verhand. d. d. Path. Gesell. 1912. xv. p. 148.
 Merkel: Deutsch. Arch. f. Klin. Med. 1871. viii. p. 210.
 Neuman: Wiener Klin. Wochenschr. 1906.
 Nichols and Wainwright: Amer. Jour. Med. Sc. 1905. Sept.
 Orsos: Verhand. d. d. Path. Gesell. 1912. xv. p. 148.
 Ogle: Internat. Congr. f. Hygiene & Demographie. London. 1891.
 Pearson: Philosoph. Trans. London. 1913. 11. p. 120.
 Peiser: Cent. f. Alleg. Path. 1908. xiv. p. 817.
 Papasotiriou: Munchn. Med. Wochenschr. 1901. No. 13.
 Ramazzini: De morbis. artificum diatribe. 1717.
 Rindfleisch: Lehrbuch. der. Path. Gewebelehre. 1878. p. 392.
 Racine: Vierteljahr. Sch. f. Gerichtl. Med. 1884. vol. 40. p. 300.
 Saito: Arch. f. Hygiene. 1912. lxxv. p. 134.
 Stratton: Edinburgh Med. & Surg. Jour. 1838. vol. 49. p. 490.
 Schottelius: Virchows Archiv. 1878. vol. 73.
 Sikorsky: Cent. f. Med. Wissench. 1870. N. 52.
 Slavjansky: Virchows Archiv. 1869. vol. 48. p. 826.
 Schmorl: Munchn. Med. Wochenschr. 1901. vol. 48. p. 1995.
 Sommerfeld: Die Schwindsucht der Arbeiter, ihre Ursache. Berlin. 1891.
 Schmitt: Lubarsch Ostertag. 1894. Abt. 11. p. 16.
 Thompson: Med. Chir. Trans. London. 1837. xx. p. 230.
 Traube: Deutsche Klinik. Berlin. 1860. xii. 475.
 Virchow: Virchows Archiv. 1847. B. I. p. 40.
Idem: Virchows Archiv. 1866. B. 35.
 Versois: Schmidts Jahrb. B. 100.
 Villeret: Cas rare d'Anthraxis. Paris. 1862.
 Zenker: Deutsch. Archiv. f. Klin. Med. B. I. p. 116.

POTASSIUM TELLURITE AS AN INDICATOR OF MICROBIAL LIFE.

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INTRODUCTION.

The fact that selenium and tellurium compounds, when brought into the living organism, are decomposed by the metabolic processes of the cells with the formation of substances of characteristic odor has been known for a long time. Gmelin (1) and Hansen (2) were the first to investigate this and toward the close of the nineteenth century the phenomenon had been closely studied and its nature determined upon by Hoffmeister (4) as a synthetical, methylating process. Gmelin, himself, in the course of his investigations, calls attention to the separation of free selenium and tellurium in organisms that had been treated with these metalloids. Beyer (5) investigated this fact more closely, and proved that preparations of selenium and tellurium, in contact with living cells, are decomposed, with a consequent pigmentation of the cells, by absorbing the element.

In the meanwhile, Chabrie and Lapique (3) showed that the microbic cell exhibited a similar relationship, their work, however, being based on mixed-cultures. The most significant work was done by Scheurlen (6) and Klett (7) who closely studied the phenomenon with single, microbic individuals, *i. e.*, with pure cultures. From experiments on twenty-seven different kinds of bacteria, they conclude that sodium selenite and sodium tellurite are reduced to metallic selenium and tellurium, respectively, by growing bacteria; and are especially suitable for demonstrating the reducing properties of bacteria. Although there are differences in the extent of reduction among the various kinds of bacteria, in general, all species have the reducing power, and the intensity of reduction is, as a whole, proportional to the intensity of growth. The reducing action of the bacteria on the selenium and tellurium compounds is produced by the bacterial cell itself (protoplasm) and not by the products of its metabolism.

The work of Scheurlen, Klett and others pointed to the fact that the selenite and tellurite are mostly adapted to prove the reductive power of bacteria. They failed, however, to take into consideration that this reduction of selenium and tellurium compounds can very well serve as an indicator of bacterial life. In fact, their work would lead to the assumption that this reduction is specific to bacteria, which is not the case, for, in our work, we have found that the salts in question can be easily reduced with-

out calling bacteria into play, as through the agency of continued heat, or strongly reducing chemicals.

More recently, Gosio (8) and Belfanti (9) have made an exhaustive study of this phenomenon, particularly with potassium tellurite. While the latter confined his attention almost exclusively to the tubercle bacillus, Gosio investigated various microorganisms and the action of such media as sera, broths, milk, etc. He calls particular attention to the value of the reaction as an indicator of germ life and finds that it is most easily produced in nutrient broth and milk, while in other media in which certain albuminoids predominate, as for example, sera, the phenomenon is definitely retarded. The addition of a small amount of cane sugar varying between 0.5 gm. and 1 gm. in 100, he also found to greatly increase the sensitiveness of the "telluric reaction."

EXPERIMENTAL WORK.

A. The Action of Potassium Tellurite on Various Microorganisms.

In our work with potassium tellurite, solutions of the salt in water were employed of such strengths that when 1 cc. was mixed with 10 cc. of culture medium, dilutions were obtained ranging from one part of the tellurite in 2,500 parts of water to one part in 300,000 parts of water. These were most conveniently prepared by taking a "stock" solution of one gram of potassium tellurite in 100 cc. of water, filtering slowly through several thicknesses of filter paper to obtain a clear filtrate, and then diluting the latter as desired. Both the commercial and Merck's highest purity potassium tellurite were used. The latter product, which is a pure, white powder, is readily soluble in water in 1 per cent. solution, and was found to be much more stable and to give uniformly better results with the various organisms.

At first, distilled water was used for the dilutions, being measured with a burette, and the solutions thus obtained were then sterilized by heating in streaming steam for an hour. However, with concentrations of the salt more than one part in 4,000 parts of water, a decomposition took place, as shown by the liquid becoming milky and the appearance of fine scaly crystals; on standing, the reagents rapidly darkened with the appearance of black flocculi. The procedure finally adopted was to take the clear "stock" solution, which is itself a germicide, and work aseptically, using sterile pipettes, dilution water, and sterile vessels. Both plain bouillon (containing 2 per cent. peptone) and 1 per cent. saccharose bouillon, as recommended by Gosio (8) were used as media, except with the tetanus bacillus, where dextrose bouillon in oil was used. Heavy inoculation was made in each case from a young bouillon culture, or an aqueous suspension of the test organism grown on suitable, solid media. Wherever feasible, a number of strains of the organism was employed in the inoculation to avoid individual idiosyncrasies. The manner of recording results is best seen

from the accompanying table with *B. coli communis*. In order to form an estimate of the most efficient strength of the potassium tellurite, the reactions obtained have been designated by the numerals 3, 2, 1, 0. In explanation, 3 signifies a strong reaction, as shown by a heavy black precipitate or flocculi; 2, a moderate reaction; 1, a faint reaction, while 0 stands for a negative result, as shown by absence of growth or coloration. Results are in triplicate, and have been recorded after a week's incubation at the optimum temperature for growth. With the exception of *B. coli communis*, the organisms studied are arranged according to the classification of Migula.

1. The Effect of Potassium Tellurite on Cultures of *B. coli communis*.

Exp't'l. numbers.	Dilution.	Medium.	Reaction.
1, 2, 3	1:2500	P.B.*	0, 0, 0.
4, 5, 6	"	S.B.	0, 0, 0
7, 8, 9	1:5000	P.B.	1, 2, 1
10, 11, 12	"	S.B.	0, 0, 0
13, 14, 15	1:10000	P.B.	2, 2, 2.
16, 17, 18	"	S.B.	1, 1, 2.
19, 20, 21	1:20000	P.B.	2, 2, 3.
22, 23, 24	"	S.B.	2, 2, 1.
25, 26, 27	1:30000	P.B.	3, 3, 3.
28, 29, 30	"	S.B.	3, 3, 3.
31, 32, 33	1:40,000	P.B.	3, 3, 3.
34, 35, 36	"	S.B.	3, 2, 2.
37, 38, 39	1:50,000	P.B.	2, 2, 2.
40, 41, 42	"	S.B.	2, 2, 2.
43, 44, 45	1:100,000	P.B.	2, 1, 1.
46, 47, 48	"	S.B.	2, 2, 2.
49, 50, 51	1:300,000	P.B.	1, 1, 1.
52, 53, 54	"	S.B.	1, 1, 1.
55, 56, 57	Controls	P.B.	0, 0, 0.
58, 59, 60	"	S.B.	0, 0, 0.

*P. B.—Plain bouillon.

S. B.—Saccharose bouillon.

As may be noted from the accompanying table, there is considerable latitude in the strength of tellurite giving the reaction. With *B. coli communis*, the typical reaction seems to be the formation of a heavy black precipitate, sometimes leaving the supernatant liquid clear, but of dark color, more often, however, diffused through the tube of the medium. (Cf. Fig. 1, #1.) A concentration of 1:30,000 of the salt seemed to give the optimum reaction, being apparent even after twenty-four hours' incubation at 37° C.

Microscopical examinations of the colon bacilli thus treated, in hanging

drop preparations, showed that the reaction produces distinct morphological changes in the bacillus. The organisms appear very much distended,

FIG. 1.

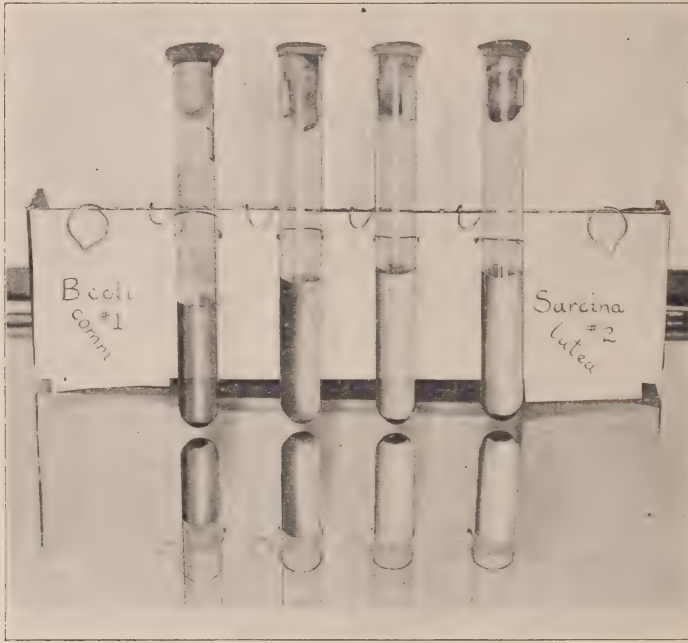
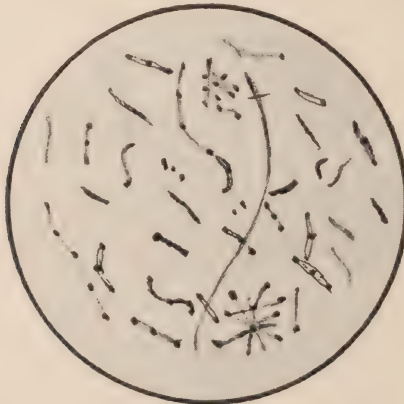


FIG. 2.



B. coli communis
Treated with Potassium Tellurite
Drawing from Hanging Drop Preparation.

some being from three to four times the normal length. Instead of being straight, many are curved, resembling spirilli. The most striking modifi-

cation, however, is the presence of black granules, resembling those of *Bact. diphtheriae* when stained by Neisser's stain, but having from three to four granules present in every organism. Especially in older cultures showing the reaction, the bacteria seemed grouped together as if they were agglutinated. Saccharose bouillon, as a whole, did not give any better reaction than did the plain bouillon.

2. *Streptococcus pyogenes*.

In working with the streptococcus, a "stock" vaccine was used, containing eleven different strains of streptococci. Here again, the action was rather slow in appearing and seemed best at 1:50,000. It is shown macroscopically by a finely granular, black precipitate clinging tenaciously to the bottom of the tube, while the supernatant bouillon is usually clear and not darkened.

Examined in the "hanging drop" there is a preponderance of short chain forms, as compared with long chains in the control tubes containing no tellurite. These short chains are composed mostly of three or four black beads, with perhaps several uncolored beads where the reaction has not been completed, all of which are the normal size.

3. *Micrococcus pyogenes albus*.

4. *Micrococcus pyogenes aureus*.

5. *Micrococcus pyogenes citreus*.

For convenience, the above three races of staphylococci were studied together, with the view, if possible, of noting any distinctions apart from their chromogenic power. In a general way, the reaction given by both the *aureus* and *albus* varieties were quite similar, that given by the former being the more pronounced. Both, however, were rather weak. The optimum concentration seems to be about 1:100,000, although good results are obtained at 1:50,000.

Seemingly in marked contrast, a strong reaction was obtained with the *Micrococcus pyogenes citreus* in every dilution studied. It would appear that, in addition to chromogenesis, this behavior towards potassium tellurite possibly might be utilized as a means of differentiation between the varieties of the pyogenic staphylococci.

In routine procedures involving laboratory diagnosis, as in the preparation of autogenous vaccines and other manipulations, it is necessary to identify the *Micrococcus pyogenes* group with the least possible delay. Where there is relatively slow pigment formation, the use of potassium tellurite might be found to possess some value.

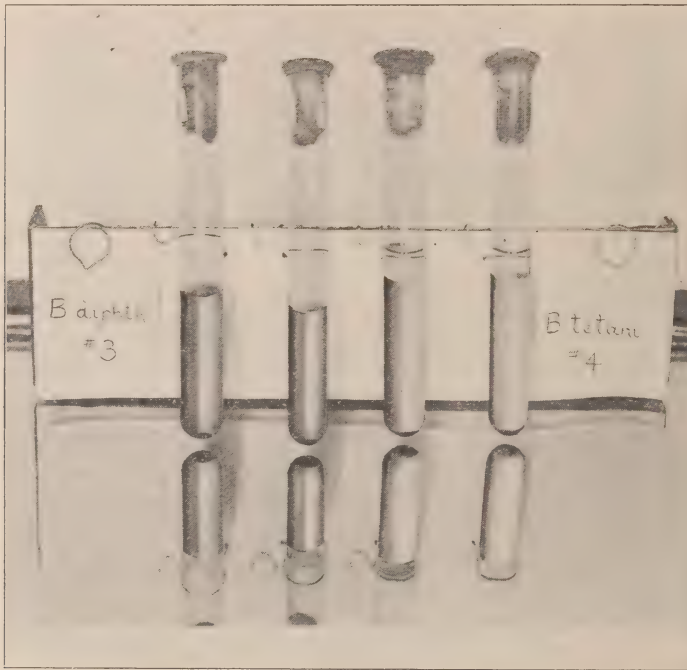
Macroscopically, the reaction with the staphylococci shows a similarity of appearance to that obtained with the *Streptococcus pyogenes*, the supernatant bouillon being clear, with a thick, viscous, black sediment. Examined in the "hanging drop," the "tellurited" organisms appear somewhat

smaller than the normal, control cultures, and are shown usually by three or four black cells, the remaining cocci in the group being unaffected.

6. *Sarcina lutea*.

Sarcina lutea seemed to react well with potassium tellurite, the tubes showing a characteristic granular sediment of a black mottled appearance, with the supernatant liquid clear. (Cf. Fig. 1, #2.) Examined under the microscope in a "hanging drop," the usual cubical packets are seen, having mostly one or two uncolored cells, the rest of the cocci being entirely black. The reaction, as a whole, is rather quick in appearing, being well developed in forty-eight hours, and seems to be best at 1:40,000.

FIG. 3.



7. *Bacterium diphtheriae*.

Although the "tellurite reaction" is rather slow in making its appearance with *Bact. diphtheriae*, it is, nevertheless, very marked. In the higher concentrations, particularly 1:10,000, the appearance of the tube was almost black, with a heavy black precipitate. The most typical reaction seems to be at 1:50,000, and is shown by a dense, black precipitate clinging tenaciously to the bottom of the tube, while the supernatant medium is cloudy, and frequently colored brown. (Cf. Fig. 3, #3.) Apparently no antiseptic action was exerted even at 1:2500, while 1:300,000 also gave a good result,

indicating a wide latitude in which the "tellurization" manifests itself. This relatively great tolerance of potassium tellurite by the diphtheria organism has more recently found practical application in the differential diagnosis of diphtheria by means of the Conradi-Troch "Tellurium plate." (Cf. Wagner (10), Schürmann and Hajós (11).)

Examined in the "hanging drop," the organism studied, which was of the Westbrook "A" type, appeared as if stained by the Neisser method. The granules were especially apparent, as were also the "V" shaped or "snapping forms," and frequent, extra large, individual cells, similar to those obtained with five hour cultures on blood serum at 37° C. On the whole, the organisms appeared much larger than when examined in a nor-

FIG. 4.



Bact. diphtheriae
Treated with Potassium Tellurite
Drawing from Hanging Drop Preparation.

mal, stained preparation, and also larger than those of the "control cultures."

8. *Bacterium tuberculosis* (Homo.).

In the work with this organism, the bacteria were first grown on glycerine agar, then accustomed to plain and saccharose bouillon by several transplantations. Owing to the scanty growth of the organism in the culture media employed, as shown by the "control tubes," the reaction in no case was very strong. Macroscopically, it appeared as an almost metallic, black, flaky deposit, or black ring, at the bottom of the bouillon tubes, the remainder of the medium being clear.

On microscopical examination, the "treated" tubercle bacilli showed several black granules, sometimes appearing as bipolar. Occasional branched forms, such as are encountered in the sputum of those suffering from pulmonary tuberculosis, are also found in some of the fields. The

action is very slow in making its appearance, and is not fully developed before a week's time. Here, also, a wide range in the dilutions giving the results is found, the best being at about 1: 10,000.

9. *Bacillus subtilis*.

As would be expected, the action is slower with *B. subtilis* than with *B. coli communis*, the first evidences of blackening appearing only after forty-eight hours. The dilution giving the best results seems to be about 1: 50,000 although the differences with the various concentrations are not as marked here as with *B. coli communis*.

Macroscopically, the action with *B. subtilis* appears as small, black clumps at the bottom of the broth tube with the supernatant liquid entirely clear and usually a blackened, wrinkled pellicle at the surface of the medium. Examined microscopically in a "hanging drop" preparation, both individual bacteria and zooglea films can be seen. In both cases, the organisms are considerably smaller than the untreated forms, and are colored a uniform black.

10. *Bacillus typhosus*.

Contrary to what would be expected, the results obtained with the typhoid bacillus differed materially among various strains, and especially from *B. coli communis*. On this account, we are making a special study of the "tellurite reaction" with the colon-typhoid group, the results of which we hope to report upon in the near future.

The typhoid bacillus seems to be peculiarly sensitive to the antiseptic action of the tellurite. Below 1: 50,000 there is very little reaction, while the best results are obtained at 1: 100,000. The appearance of the typical reaction is very similar to that of the colon bacillus—a powdery, black precipitate at the bottom of the tube, usually diffused through the supernatant liquid, giving it a brownish-gray tinge. On microscopical examination, however, a marked difference is apparent. The "tellurited" organisms appear about two-thirds as large as the normal typhoid bacilli, are non-motile, and instead of the four granules of the colon bacillus, these have a single, round, black granule at each pole. Occasionally an organism is seen having three such granules, while others are found considerably smaller in size and entirely black in color. The reaction is comparatively slow in appearing.

11. *Bacillus abortus* (Wien I).

A culture of *B. abortus* being available at the time of this investigation, it was thought advisable, in the interests of completeness, to compare the action of this organism to potassium tellurite. As was expected, the reaction with *B. abortus* was not very pronounced, owing in a great measure to the fact that the organism, itself, requires special, anaërobic cultivation. The results obtained, however, seem to justify the conclusion, that the bacillus of contagious abortion gives the "tellurite" reaction. About

1: 50,000 seemed to give the best results. At this concentration, it showed as a slight, brownish turbidity with a blackened sediment in the tubes. Microscopically, the bacilli, which normally are well isolated, appear grouped together in two and threes in a row, so that at first glance they might be mistaken for darkened bacilli with several spores, or light-colored granules.

12. *Bacillus prodigiosus*.

Bacillus pyocyaneus.

B. pyocyaneus and *B. prodigiosus*, in mixed culture, gave a marked reaction with tellurite, particularly in the concentrations ranging from 1: 5000 to 1: 20,000. Macroscopically, this was shown by a decided blackening, usually diffused throughout the entire medium with a black ring at the surface, but appearing as a black sediment in the higher dilutions. Chromogenesis is not affected, as is evidenced by the fact that the tubes showing the black deposit still had the greenish fluorescence and the red ring characteristic of *B. pyocyaneus* and *B. prodigiosus*, respectively, when grown in bouillon. Examined microscopically in the hanging drop, the smaller, oval *B. prodigiosus* is found to be uniformly blackened and only slightly motile. The larger *B. pyocyaneus* appears with two or more black granules, the motility being unaffected. The reduction is very rapid, being plainly evident after twenty-four hours' incubation.

13. *Bacillus mesentericus*.

For *B. mesentericus*, a concentration of about 1: 30,000 seems to give the best reaction with potassium tellurite, although a good result is obtained even at 1: 300,000. Concentrations stronger than 1: 10,000 have an apparent, antiseptic action. The reaction is rather slow in appearing, and is shown by a dark, grey-black sediment, the supernatant medium being clear.

Microscopically, the bacilli appear much smaller than normal with bipolar, black granules. Occasionally, an organism is found uniformly colored black. The motility is less than normal, and spore formation is not so apparent.

14. *Bacillus tetani*.

Owing to the strict, anaërobic requirements of the tetanus bacillus, the ordinary technique could not be observed. Accordingly, glucose bouillon with neutral oil was chosen as the medium, and inoculated with four drops of a good growing bouillon culture of the organism. This was then incubated for two days at 37° C. and finally potassium tellurite added, as usual, to give the various concentrations.

Unlike most of the other organisms studied, the best reaction of the tetanus bacillus was at the strongest concentration employed—1: 2500. As would be expected, the reaction is slow in appearing, and is first shown by

a brown ring near the top of the culture tube. This gradually extends down to the bottom, giving a black flaky deposit, with the supernatant medium brown and turbid. (Cf. Fig. 3, #4.)

Examined in "hanging drop" preparation, almost the first thing noticed is the decided, granular appearance of the bacillus. Exceptionally long forms, showing as many as twelve black granules are frequent, and, in some cases, show the characteristic "drum-stick" spore. The large spores, sometimes noted with this organism, are also seen, seemingly with a black spot in the centre of the spore. The reaction takes at least a week before completion, but is distinct even at 1:100,000.

FIG. 5.

*B. tetani*

Treated with Potassium Tellurite
Drawing from Hanging Drop Preparation.

15. *Spirillum tyrogenum*.

The reaction with this organism was very slow in appearing and not very marked. The tubes showing the most typical results had either small, black, granules in the sediment at the bottom of the tube, or a black ring. On microscopical examination, the spirilla were found to be smaller than normal, sluggishly motile, and colored uniformly black. About 1:40,000 seems to be the concentration giving the best results.

16. *Saccharomyces cerevisiæ*.

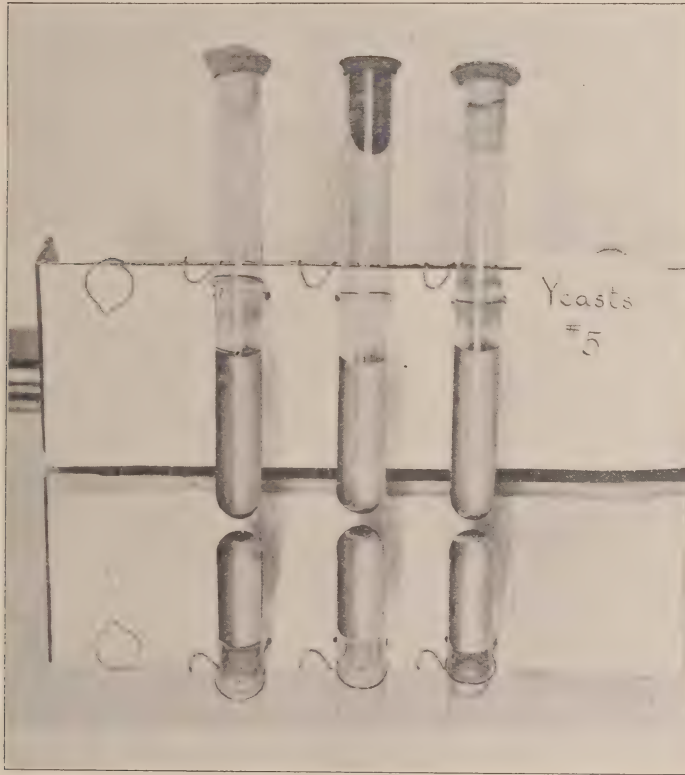
Saccharomyces glutinis.

Saccharomyces albus.

For studying the action on yeasts, a culture was used, consisting of the ordinary beer yeast—*Saccharomyces cerevisiæ*—together with two so-called "wild yeasts,"—*Saccharomyces albus* and *Saccharomyces glutinis*. The material used for inoculation was obtained by washing off a twenty-four-hour, 20° C. agar slant culture into sterile water.

The "tellurite" action with yeasts is very rapid, being distinctly visible after incubating for eighteen hours at room temperature, which is the most suitable for growing the yeasts. With the exception of the highest dilution (1:300,000), all of the tubes showed a characteristic, heavy, black deposit, frequently extending up through the culture medium, with a black ring at the surface. (Cf. Fig. 6.) The cells of the *albus* and *glutinis* were, in most instances, found to be stained deeply black, while that of the *cere-*

FIG. 6.



visia showed black granules, the remainder of the cell being unaffected. No alteration in size or tendency towards involution forms was noticed.

17. *Penicillium glaucum*.

Aspergillus.

For the study of the action on molds, the bouillon tubes were inoculated with the ordinary blue-green mold—*Penecillium glaucum*, together with a variety of *Aspergillus*, species unknown. The incubation here, also, was at room temperature, but the reactions obtained were much stronger than

THE ACT ON OF POTASSIUM TELLURITE ON VARIOUS MICROÖRGANISMS

Organism.	Macroscopical appearance.	Microscopical appearance.	Concentrations giving reaction and optimum concentration.
1. <i>B. coli communis</i> .	Heavy black ppt., diffused through medium. Action rapid and strong.	Bacilli larger, curved and clumped. 3-4 black granules.	1:10,000—1:300,000 1:300,000
2. <i>Strep. pyogenes</i> .	Finely granular black ppt. supernatant bouillon clear. Action slow and moderate.	Normal size, short chains. 3-4 black beads in chain.	1:40,000—1:300,000 1:50,000
3. <i>Mic. pyog. albus</i> .	Small, viscous, black sediment; supernatant bouillon clear. Action slow and feeble.	Smaller size with 3-4 black cells.	1:40,000—1:300,000 1:100,000
4. <i>Mic. pyog. aureus</i> .	Small, viscous, black sediment; supernatant bouillon clear. Action slow and feeble.	Smaller size with 3-4 black cells.	1:40,000—1:300,000 1:100,000
5. <i>Mic. pyog. citreus</i> .	Thick, viscous, black sediment; supernatant bouillon usually clear. Action strong.	Smaller size with 3-4 black cells.	1:2,500—1:300,000 1:50,000
6. <i>Sarcina lutea</i> .	Characteristic, gran. black sediment. Supernatant liquid clear. Action rapid and strong.	Normal size with blackened cells.	1:2,500—1:300,000 1:40,000
7. <i>Bact. diphtheriæ</i> .	Dense, clinging, black ppt. Supernatant liquid cloudy and brown. Action slow but strong.	Bacteria larger with numerous black granules.	1:2,500—1:300,000 1:10,000
8. <i>Bact. tuberculosis (Homo)</i>	Metallic, black, flaky deposit. Supernatant liquid clear. Action slow and feeble.	Bacteria branched and granulated.	1:15,000—1:300,000 1:10,000
9. <i>B. subtilis</i> .	Small, black clumps; supernatant liquid clear with black pellicle. Action rapid and strong.	Bacilli smaller and uniformly black.	1:20,000—1:300,000 1:50,000

THE ACTION OF POTASSIUM TELLURITE ON VARIOUS MICROÖRGANISMS
Concluded.

Organism.	Macroscopical appearance.	Microscopical appearance.	Concentrations giving reaction and optimum concentration.
10. <i>B. typhosus</i> .	Powdery, black ppt. diffused through medium. Action slow and moderate.	Smaller size with one black polar granule.	1:50,000—1:300,000 1:100,000
11. <i>B. abortus</i> .	Slight brownish turbidity with black sediment. Action slow and feeble.	Bacilli grouped and entirely blackened.	1:5,000—1:300,000 1:50,000
12. <i>B. prodigiosus</i> . <i>B. pyocyaneus</i> .	Black sediment, diffused through medium with black ring. Action rapid and heavy.	Normal size; <i>B. prod.</i> blackened and <i>B. pyocy.</i> granulated.	1:5,000—1:300,000 1:50,000
13. <i>B. mesentericus</i> .	Dark, grey-black sediment; supernatant liquid clear. Action slow and moderate.	Bacilli smaller with bipolar, black granules.	1:20,000—1:300,000 1:30,000
14. <i>B. tetani</i> .	Black, flaky deposit; supernatant liquid brown and turbid. Action very slow but heavy.	Bacilli larger with numerous black granules.	1:2,500—1:100,000 1:2,500
15. <i>Spir. tyrogenum</i> .	Small, black granules or black ring. Liquid above, clear. Action slow and feeble.	Org'ns. smaller and blackened. Motility affected.	1:2,500—1:300,000 1:40,000
16. <i>Sacch. cerevisiæ</i> . <i>Sacch. albus</i> . <i>Sacch. glutinis</i> .	Characteristic, heavy, black sediment; supernatant liquid blackened and with ring. Action very rapid and strong.	Normal size, <i>Sacch. alb.</i> and <i>Sacch. glut.</i> blackened, while <i>Sacch. cerev.</i> granulated.	1:2,500—1:300,000 1:50,000
17. <i>Penicillium glaucum</i> . <i>Aspergillus</i> .	Heavy, black, felted mass, extending into medium. Action very rapid and strong.		1:2,500—1:300,000 1:50,000

Average optimum concentration, 1:50,000.

with the yeasts. In almost every instance, the surface of the tube was covered with a heavy, black, felted mass, frequently extending down into the medium itself. Apparently the various concentrations had very little influence on the intensity of the reaction, as it was as marked at 1:2500 as at 1:300,000 and, in each case, appeared in twenty-four hours.

B. General Considerations of the "Tellurite Reaction."

As true of any "vital reaction" where chemical changes are produced through the agency of living material, both physical and chemical factors have a marked influence on the action of potassium tellurite on microorganisms. Essentially, this is a reduction from the tellurite to metallic tellurium, probably with the formation of hydrogen and hydrogenated compounds. This is evidenced by the fact that with the *Bact. tuberculosis*, not only did we find the black metallic precipitate indicative of the tellurium, but several of the tubes had a garlic-like odor analogous to the arsines, and which in all probability were hydrogenated tellurium compounds or "tellurines." Theoretically, then, the presence of saccharose in the medium as recommended by Gosio (8) should make it more easy for the bacteria to reduce the tellurium salt through the formation of special fermentation products. Our work, however, has failed to find any material advantages resulting from the use of saccharose bouillon. In fact, with *B. mesentericus*, *B. abortus*, *Streptococcus pyogenes* and *B. coli communis* the plain bouillon seemed even slightly better than the saccharose.

The presence of acids or alkalies, as would be supposed, interferes with the "tellurite reaction," the acids more so than the alkalies. This is due, not only to actual inhibitory action upon the bacteria, but also to a chemical decomposition of the tellurite, as shown by the formation of a white precipitate. Similarly, strong heat, cold, and light have both an action on the salt, and an action on the bacteria. With solid media, such as agar, addition of potassium tellurite 1:5000 to melted agar at 60° C. gave a decided brown color after solidification, while no effect was noticed when the agar was kept at 30° C.

It is also readily apparent that to obtain good results with potassium tellurite, the organism must be in an active state of metabolism. Any factor influencing the growth of the microbes will consequently influence the "tellurium reaction." The presence of dilute antiseptics, by retarding the growth of the bacteria, hinder the reduction phenomenon. In this connection, it must be borne in mind that the potassium tellurite, itself, has a relatively strong germicidal action. A germicidal assay of this salt made by our colleagues, H. C. Hamilton and T. Ohno, by the Hygienic Laboratory Method, gave a phenol coefficient of 6. For comparative purposes, an "antiseptic value" test was made at the same time by inoculating 5 cc. of the tellurite in various dilutions with 0.1 cc. of a twenty-four-

hour culture of *B. typhosus* (Hopkins) in bouillon. After forty-eight hours' contact, a subculture was planted in bouillon, and its condition recorded after forty-eight hours' time for growth in the medium. The results indicated that potassium tellurite can be used as an antiseptic in a concentration of 1:2500, provided the organisms are exposed to the action of the solution for at least forty-eight hours.

It is evident from our results that the capacity for reducing potassium tellurite varies with the different microorganisms. Some, as for example, the yeasts, molds, and *Bact. diphtheria*, are especially energetic, while others, as for example, *B. abortus*, and *Spirillum tyrogetum*, gave a weaker action. Including our work with the colon-typhoid group, we have studied over twenty-five species of microorganisms. In every instance, the capacity for decomposing the potassium tellurite was present in a manner easily perceivable by the naked eye. Naturally, where bacteria are present in the spore form, no reduction of the tellurite can take place. It seems fair to assume, then, that the power of reducing potassium tellurite with the formation of characteristic black compounds is common to all microorganisms in an active state of metabolism.

The best results seem to be obtained with those organisms commonly found as sources of contamination, as the colon bacillus, the hay bacillus, yeasts, molds, and others. Therefore, potassium tellurite appears to be well adapted as an indicator of microbic life in general, but is especially suitable as an indicator of ordinary bacterial contamination occurring under practical conditions.

A general survey of the reaction with the various microorganisms studied seemed to show that an average concentration of 1:50,000 is the most suitable for the use of potassium tellurite as an indicator. Using such a concentration of the salt, we have tested for sterility numerous aseptic, biological and chemical preparations, including sera, bacterial vaccines, alkaloidal and drug products under varying conditions. The criterion in each case was the presence or absence of a black precipitate or coloration. Controls were run at the same time, and the results checked in each instance by growing the material both aëroically and anaëroically in suitable culture media. The material was so selected or treated that about one half was actually contaminated. In practically every case, the cultural results and those obtained by the indicator were in entire agreement.

The possible application of potassium tellurite in hypodermatic products, brought up the question of its toxicity and irritating action. In experiments which were conducted by our colleague, O. E. Closson, with guinea pigs, 0.3 cc. of 1-100 solution produced marked congestion at the injection site when examination four days after. 1 cc. of 1-2000 showed locally a congestion at the end of forty-eight hours; 2 cc. of 1-5000 showed locally only a very slight inflammation at the end of forty-eight hours; 6.5 cc. of 1-15,000 showed locally no signs of the injection at the end of forty-eight

hours. Contrary to the findings of Gosio (8), the minimum lethal dose for guinea pigs at the dilution 1-2000 was 0.003 gm. per kg. Autopsy on the animals killed with the salt showed a gastro-intestinal inflammation; the site of the injection was inflamed, and had a dark deposit with a garlic-like odor.

A dog receiving subcutaneously 5 cc. portions of 1-1000, 1-2000, 1-4000, 1-8000, 1-15,000, and 1-30,000, examined at the end of forty-eight hours, showed some inflammation at the point of injecting the 1-1000 solution, just a trace at the 1-2000, and no indication at the points where the more dilute solutions were injected. A dog receiving 2 cc. portions of the same solutions, examined four days later, showed a very considerable congestion at the site of injecting the 1-1000 solution, just a trace at the 1-2000, and at the 1-8000, and absolutely none at the other points of injection.

CONCLUSIONS.

1. Nearly all of the more common microorganisms react with potassium tellurite, forming characteristic, black compounds.
2. This capacity depends on an active state of metabolism of the reacting organism, and the action is, in all probability, a reduction of the tellurite.
3. The "tellurite reaction" can be used as an indicator of microbial life, and is especially suitable for revealing microbic contamination.
4. A dilution of 1: 50,000 of the salt seems to be most suitable for its action as a general microbic indicator. In this concentration, it produces no irritative action when introduced into test animals.

BIBLIOGRAPHY.

1. Chr. Gmelin—"Versuche über die Wirkungen des Baryts, Strontians, u.s.w." 1824, Tübingen (from *Ztschr. f. Hyg. u. infkr.* 1905, V. 51, p. 72).
2. K. Hansen—"Versuche über die Wirkung des Tellurs auf den lebenden Organismus." *Annalen der Chemie und Pharmacie*, 1853, V. 86.
3. C. Chabrie und L. Lapicque—"Sur l'action physiologique de l'acide salenieux." *Compt. rend. de l'Acad. des Sciences.* 1890, V. 110.
4. Hofmeister—"Ueber Methylierung in Thierkörper," *Archiv. f. experim. Pathol. u. Pharmacol.* 1894, V. 33.
5. I. L. Beyer—"Durch welchen Bestandtheil der lebendigen Zellen wird die Tellursäure reducirt?" *Archiv. für Physiologie von Dubois, Reymond*, 1895.
6. Scheurlen—"Die Verwendung der selenigen, und tellurigen Säure in der Bakteriologie," *Ztschr. f. Hyg. und Infkr.* 1900, V. 33, p. 135.
7. A. Klett—"Zur Kenntniss der reducirenden Eigenschaften der Bakterien," *Ztschr. f. Hyg. und Infkr.* 1900, V. 33, p. 137.
8. B. Gosio—"Indicatoren des Bakterien Lebens u. ihre prakt. Bedeutung." *Ztschr. f. Hyg. und Infkr.* 1905, V. 51, p. 72.
9. S. Belfanti—"Die vitale Reaktion nach Gosio beim Tuberkelbazillus." *Ztschr. f. Chemotherapie und verwandte Gebiete.* 1912, V. 1, pt. 2, p. 113.
10. G. Wagner—*Münchener medizinische Wochenschrift.* 1913, V. 60, No. 9, p. 457.
11. W. Schürmann and E. Hajos—*Deutsche medizinische Wochenschrift.* 1913, V. 39, No. 17, p. 786.

IS PELLAGRA DUE TO AN INTESTINAL PARASITE?

BONEY WELLS PAGE, A. B., M. D.,

Whole Time County Health Officer of Robeson County, Lumberton, N. C.

I wish to report for further investigation by the medical profession an animal parasite found in pellagrin feces. The parasite appears in three different forms. First, an oval form resembling an amoeba but only about one-fiftieth to one-eighth the size of the latter. This trembling coccus slowly changes its position on the slide. It often changes its shape into the second form, that of a bacillus, which is capable of darting across the field and disappearing from view. Either of these forms may change into the third form, that of a spirilla, which is very active but makes little progress across the field. In advanced cases of pellagra that have had little treatment the parasite changes its form very often.

The technique for examination is the same as that for hookworm or amoeba except that the oil immersion, one-twelfth is used instead of the lower powers. The parasite may be found in feces several days old.

I have found the parasite in the feces of seventeen different pellagrins examined. In two instances, the amoeba was associated. In four others the hookworm ova were present. For the past three summers I have found the parasite in the feces of one patient, who had no clinical symptoms of pellagra except a chronic dysentery.

The prophylactic treatment, I believe, is the same as that for typhoid fever or amoebic dysentery.

The most successful treatment that I have tried in the incipient stage is flowers of sulphur, ten grains three times a day for several days. In the advanced stage, atoxyl and other preparations of arsenic render the parasite less active within a few hours. Emetin seems to have no effect on the parasite.

If this parasite proves to be the real cause of pellagra we would conclude that the disease, no doubt, is much more prevalent in the South than believed. The host of mild cases as yet undiagnosed are spreading the disease as well as those severely afflicted.

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REPORT OF COMMITTEE ON RIVER CLEANING.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs.
September, 1913.

The Committee on River Cleaning presents the following report for the consideration of the Section. The subject assigned to this committee for an investigation is so complicated and covers such a broad field that it has not been possible to give more than a general consideration to it during the past year. There are many phases of the problem, which ought to receive thorough study, and their importance both from the point of view of the public health and the financial burdens involved, will require the expenditure of much time and considerable money. The detailed investigations upon which this committee's work will be based, must be made by municipal, state and national authorities. The committee can hardly hope to do more than to coöperate in such work and crystallize the results as they become available from time to time. In this report the committee has endeavored to set forth some general considerations and has pointed out a few of the lines along which further investigations may profitably be made. It is evident if this work is to be carried on until substantial results have been accomplished, that it will be necessary to provide for the continuance from year to year of a committee which shall devote its attention to this subject.

First of all, the term "river cleaning" does not seem to us to be wisely chosen, and we beg therefore to substitute the term "sanitary control of water ways," so that in the future this committee will be known as the Committee on the "Sanitary Control of Waterways."

As generally conceived, the pollution of waterways means the discharge into them of putrescible, infectious, or unsightly substances such as sewage or liquid industrial wastes, as well as floating solids and solids which may deposit and cause obstructions or unsightly refuse banks.

The different ways in which the pollution of waterways may prove objectionable may, for the purpose of discussion, be enumerated as follows:

(1) Persons living on or near or frequenting the banks of a polluted stream may be subjected to a nuisance resulting from foul odors, unsightly water and a foul stream bed.

(2) Public water supplies drawn from polluted streams may be dangerously affected if the water is used without purification, or if purification works are improperly operated or an undue burden is placed upon them.

(3) The value of waterways for recreation purposes such as boating, fishing, camping, or swimming, may be partially or wholly destroyed by pollution.

(4) Fish and shellfish life may be injuriously affected or destroyed by pollution.

(5) Cattle pasturing along the banks of a polluted body of water may be injuriously affected by drinking or standing in the water.

(6) Industries requiring pure water in processes of manufacture may be injuriously affected by pollution.

(7) The deposition of solids from polluting material may cause foul refuse banks and obstruct channels.

(8) Irrigation farming may be injuriously affected if the water used for irrigation is polluted either by causing a nuisance in the irrigation fields or by contaminating fruits and vegetables eaten raw.

In judging a waterway from the foregoing points of view, it is manifest that the same standards cannot be applied in all instances, nor the same devices for measuring the extent of pollution. Much of the confusion that at present exists in the popular mind, and even in the minds of sanitarians, results from failure to appreciate the impracticability of applying the same standards to all waterways. To make this statement somewhat clearer, the several aspects of the subject above enumerated will be briefly discussed with reference to reasonable requirements and the measuring devices that may be applied to determine when such reasonable requirements are met.

(1) Where it is only necessary to prevent a nuisance, and the waterway has no other practical use than that of an open drainage course, no greater requirement need be made than that the water be non-putrescible, free from unsightly color and suspended, or floating matter, and that no sludge banks or other objectionable deposits be formed. As a measure of such pollution a knowledge of the physical character of the polluting matter and the diluting water, such as color and suspended solids, together with a knowledge of its biological character, as shown by the oxygen absorbing power, would be of greatest service. Such a measure has recently been proposed by the Royal Commission on Sewage Disposal in England, and standards of this kind have been proposed for New York Harbor by the Metropolitan Sewage Commission. The perfection and general use of analytical examinations of polluted water based upon biological activity will undoubtedly prove of great service in studying the sanitation of waterways.

(2) The permissible degree of waterway pollution where such waterways are used as sources of public water supply is very difficult to determine, yet there is apparently a need for some such standard, even though it be a somewhat arbitrary one.

When such a standard is established it ought obviously to rest not upon analyses alone, but quite as much upon the sanitary conditions of the watershed as revealed by inspection, upon knowledge of stream flow at high and

low water, the population and industries tributary to the sewers, the distance of pollution above the water-works intake, and the like. In other words, some index must be obtained of the danger of infection. Nor must the esthetic sense of the community be offended by using water obviously foul.

Your committee regrets that it cannot present at this time a suitable index to be used as a standard for waterways that come within this grouping.

(3) The use of waterways for recreation purposes places a great demand upon the purity of the water, and here again the required standard is difficult to define. From a broad sociological point of view the maintenance of clean waterways, suitably located for recreation purposes, should be encouraged, for they afford cheap and wholesome recreation grounds for congested urban populations.

In establishing sanitary standards for this class of waters esthetic considerations must play a predominant part. The water must appear to be clean and there must be no sewage or wastes discharged into it that will prejudicially affect the appearance or odor of the water even in the immediate vicinity of the sewer or waste outlets. If such waterways are used for bathing purposes it is important that no untreated sewage or wastes be permitted to enter the water course, except at points so remote that self-purification is assured at all stages of the water.

(4) As to fish and shellfish life in waterways, it is interesting to note that pollution may injure or promote such life according to the nature and amount of the substances entering. When injury occurs, the permissible degree of pollution in a waterway is an essentially economic proposition, to be decided after a comparison of the damage done or expected and the cost of preventing the damage.

In the examination of waterways with reference to fish life, analyses are of special value. To support fish life water must contain certain quantities of oxygen and full information regarding this point can only be obtained by analytical means. Experiments on this subject are needed. Shellfish suffer greatest danger from comparatively small quantities of pollution matter not perceptible to the unaided senses and here rather delicate methods of bacterial analysis are needed to indicate the danger. Fish and shellfish both depend for their food supply largely upon the plankton, and in this connection a wide field is opened for the perfection and standardization of methods of analyses for determining the plankton content of waters with special reference to its value as a fish food.

(5) The question of the danger to cattle from drinking from polluted water courses should also be regarded as one to be settled upon economic grounds. For example, it may be cheaper to fence off a stream and provide a well from which water for cattle may be derived than to prevent

the stream from being polluted. It is interesting to note, however, that very many complaints against waterway pollution in rural districts arise from alleged injury to cattle and this applies with particular force to very small streams which receive the sewage discharge from small communities.

The injury resulting to cattle from drinking from polluted streams is difficult to define. About the only specific disease that may be carried through the ordinary channels of pollution is anthrax, but this is of very rare occurrence in this country. The most persistent complaint is that cattle seem to thrive poorly, grow thin and die; yet there are also many instances where cattle for many years have drunk from a polluted stream and seem none the worse for the experience. Before the extent of the injury to cattle by polluted waterways can be intelligently considered, there must be brought together more data than now exist, and inquiries along this line are suggested for the consideration of a succeeding committee.

(6) Injury to industries by waterway pollution must be considered on a strictly economic basis, that is to say, the cost of preventing the pollution and the damage that accrues to the industries from such pollution must be compared. The means for measuring pollution in such cases must vary with the character of the industries affected, and no general rules may be laid down.

(7) The obstruction of channels by solid matter as distinct from the unsightly and malodorous sludge banks is a problem that sometimes must receive consideration. Such obstructions only rarely result from sewage discharge, but may result in marked degree from certain industrial operations such as hydraulic stripping of quarries and sluicing operations. An element that may enter at times is the danger that floods may result from undue restriction of waterways by heavy deposits of wastes.

(8) A highly polluted water may be seriously objectionable when applied to irrigated fields. If such water is spread out over large areas and permitted to become stagnant it may give off offensive odors throughout a large neighborhood. This is all the more significant in the light of the fact that intensive farming methods used in irrigated areas give these areas many of the characteristics of suburban communities. A somewhat remoter danger is the pollution of vegetables and fruits eaten raw by coming in contact with polluted irrigating waters.

Ordinarily a condition of stability for irrigation waters is all that is necessary, though special cases may require a still higher degree of purity. Further study of the relation between waterway sanitation and irrigation should be made.

It will be noted that in the foregoing discussion comparatively little emphasis has been placed upon the relation of waterway pollution and

public health, but that much stress has been placed on the economic phase of waterway sanitation and it is important that this phase be most fully recognized. As a mere matter of civic cleanliness and public decency, public places and public waterways should be kept in a reasonably clean condition, but in approaching the solution of any problem involving waterway sanitation the question should invariably be asked "What is the value of the benefits derived, as compared with the cost of maintaining the stream in an acceptably clean condition?"

Broad generalizing must be avoided, for nearly every waterway is a law unto itself, varying in its remoteness from public view, in its variations between high and low water, in the accessibility of its banks, in the uses to which it may be put, and the physical condition of the water in its normal state and in other ways.

The legal control of stream pollution and the sanitation of waterways varies greatly in the different states. In order to exhibit these differences and at the same time to ascertain their relative usefulness the committee has invited the engineers of a large number of state departments of health to present brief papers discussing the operation of the laws in their several states. And the committee wishes to take this occasion to thank those who have so kindly accepted this invitation. We hope that these presentations will form the nucleus of a more detailed compendium of existing state laws on the subject of stream pollution, to be prepared during the coming year, should the section see fit to ask the committee to continue its work.

GEORGE C. WHIPPLE, *Chairman.*

PAUL HANSEN, *Secretary.*

ANDREW J. PROVOST.

THEODORE HORTON.

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BOOK REVIEWS.

Leviathan. By Jeanette Marks. George H. Doran Company, N. Y., and Hodder and Stoughton, London.

Leviathan strikes right from the shoulder; it doesn't mince matters that shouldn't be minced. It tells the truth. It doesn't condone or defend; it simply says yes and no. That is an accomplishment. It deals with drug addictions, morphine, cocaine, heroin and others. It places the blame where the blame belongs in three distinct places, in the following responsible order: the family physician, the druggist, and the user. When that has been said, the etiology is complete. A combination of any two makes for worse, but the fundamental facts are as stated. Read it and believe. If you don't want to believe, investigate, then you must believe. That is the worst of an unwilling truth, it hits hard.

There are many volumes to be found, "written with an object"; treating of social or economic problems; presenting views of value to the bookseller as material that will empty his shelves through the medium of a fanatic or faddist public. The message they carry is most commonly a selling average established by a gullible and ignorant public on the one hand and a mode writer on the other.

A notable exception to this variety of purpose story is *Leviathan* by Jeanette Marks. Here has been undertaken a portrayal of a national and international vice that, though more or less commonly known, has been almost completely neglected for too many generations. In *Leviathan* may be found the etiology, the symptom-complex and the cure—a rare combination, too rare in stories of social reform as well as in medical treatises.

The authoress has been brutally frank, so frank, indeed, that she will scarcely gain credence, but at the same time so technically correct that the unbiased medical man undergoes a keen enjoyment in the perusal of her work.

It is a common criticism that the altruistic exponent of any social or economic problem handles his subject with either venom or ignorance. Neither of these criticisms may be made of *Leviathan*.

Every practicing physician, every health officer and every thinking man and woman could gain a true insight and, indeed, a very profitable knowledge of this greatest of all social problems from this work.

This country and the civilized, that is to say the sanitary, world has been, and to good effect, lamenting over and fighting tuberculosis; an army of workers have joined hands against John Barleycorn; a multitude have assailed the factors which unite to raise our infant mortality, yet the "greatest of these," the most insidious of all our moral sores and public maladies has been left to a few courageous knights of the pen among whom the authoress of *Leviathan* must be mentioned early. They have borne a lone-some burden for the common weal.

It is furthermore refreshing in the extreme to find, in lay writers, a correct scientific technique and a true insight into a situation as closely associated with a profession known for its mystery and probity (?) as Miss Marks has shown in her wonderful work.

C. E. Terry.

The Microscopy of Drinking Water. By George Chandler Whipple, Gordon McKay Professor of Sanitary Engineering, Harvard University and the Massachusetts Institute of Technology. 3d edition, xxi+409 pp. John Wiley & Sons, 1914. \$4.00 net.

The appearance of a new edition of Professor Whipple's excellent book should be most welcome to all those who are actively engaged in the examination and control of

water supplies or in the scientific and theoretical problems connected with this branch of sanitary engineering. For several years the earlier editions have been regarded as au-

thoritative, and Professor Whipple is recognized as the master in this field in America. The new edition makes his position still more secure, for the book has been practically rewritten, revised wherever modern investigation and recent literature have supplied new data of value, and enlarged by the addition of several new chapters. Of these chapters XIV, XVI, and XVII, dealing respectively with Soil Stripping, Copper Treatment for Algae, and Purification of Water Containing Algae should receive special mention.

Another new chapter, written by Dr. J. W. M. Bunker, on the Microscope and Its Use, and Photomicrography, has also been introduced.

This chapter gives the usual suggestions supplied by the manufacturers of microscopes for the care, use and manipulation of the instrument and its accessories, and will undoubtedly aid those who undertake the examination of water without having had previous experience or training.

In general treatment the book is divided into two parts: Part I deals with the methods and the application of microscopical examination of water as well as with those practical phases of treatment of water supplies which Mr. Whipple has employed in his long and distinguished experience as a biological engineer. A brief historical survey is followed by a concise statement of the objects of microscopical examination, and clear and excellently illustrated descriptions of the methods to be used. Then follows the chapter on the Microscope. Chapter VII, on Limnology, presents the subject of water study as a separate science, and deals with the properties of this medium in a particularly definite and instructive manner. The treatment here is particularly interesting and the viewpoint new and broad, data being correlated and digested instead of presented merely as isolated and unrelated facts. The four following chapters (VIII, IX, X, and XI) present the most important facts as to occurrence and distribution of microorgan-

isms in water and the agencies influencing their development and presence. The subject of Odors in Water Supplies is exhaustively treated in Chapter XII.

The remaining chapters of Part I, constitute the bulk of the new material already mentioned and are uniformly excellent. Written after an abundant practical experience they are sure to be of great service to Sanitary Engineers and Water Works Managers.

Part II gives detailed descriptions of the organisms encountered in water supplies. These descriptions are undoubtedly the best that have ever appeared and are logically arranged. Brief but clear statements regarding classification of organisms make this portion of the book especially valuable, and only the highest praise can be given to it.

A particularly noteworthy feature of Part II is a series of nineteen plates reproduced in color, illustrating the principal types of algae, both blue-green and green, diatoms, fungi, protozoa and other animal forms occurring in water supplies.

The originals for these figures were drawn by Mr. Whipple himself and in general show very clearly the differentiation in form and pigment distribution. Unfortunately the process of reproducing the author's sketches has failed to give true color values in many cases, but the differentiation is nevertheless so well marked that the plates will be of immense service to the student in recognizing the organisms. The whole work is careful, well arranged and thorough, and the book singularly free from errors in type or text. The reviewer wonders if the name of Prof. W. G. Fowler appearing on Page 220 should not be Prof. W. G. Farlow.

Illustrations by diagrams, photographs and photomicrographs are of unusual excellence and the Tables are exceptionally fine.

Only praise can be accorded a volume which is so clearly a masterpiece.

S. C. Prescott.

Rearing an Imperial Race. By Charles E. Hecht, M. A., containing a full report of the Second Guildhall School Conference on Diet Cookery and Hygiene, with Dieteries; Special Reports from H. M. Ambassadors Abroad; Articles on Children's Food Requirements, Clothing, etc. Demy 8 vo. cloth, gilt, 7s, 6d, net. The St. Catherine Press, 34 Norfolk St., Strand, London, 1913.

Fully as informing as a set of text-books on dietetics, home and school life, and hygiene of children, will be found the collection of papers on these related subjects presented in *Rearing an Imperial Race*, which gives the deliberations of a notable English conference held at London in June, 1913.

The desire of foreign students to ascertain the effectiveness of the English and Scottish Education Acts (Provision of Meals) furnished the *raison d'être* of this conference, and its further justification is found in the dissemination of clear ideas and sound knowledge which the printed record accomplishes in an admirable manner.

Stress is laid on the provision of meals for under-nourished school children. The refreshing and inspiring note of the discussion is manifest in the frankness which characterizes it throughout.

The point is made that often the social and educational aspects of the school meal are not sufficiently emphasized. To overcome this deficiency, it is suggested that the service of food prepared by the pupils themselves should be utilized as an educational instrumentality.

The theory of school feeding lacked no support. It was asserted that a well organized scheme of school feeding was a formidable force in the battle against tuberculosis and malnutrition which often lie "at the root of much preventable physical suffering, inefficiency and death."

To the student of the school lunch, not the least important of the dissertations is that of Mr. Nicholls, who traced with great clarity the genesis of the school lunch movement in England. He reiterated the well-known recommendation of the 1903 inter-departmental committee on physical deterioration, that "no purely voluntary association could successfully cope with the full extent of the evil" of malnutrition, the three cardinal causes of which were attributed to (1) the want of food, (2) the irregu-

larity with which children get their meals and (3) the unsuitable character of the food when they get it.

Then in a most illuminating manner, Mr. Nicholls gives some administrative details of school feeding and the experience of other countries which the student of this problem cannot afford to miss.

That the teaching of hygiene be made compulsory was the keynote of another notable contribution to the congress. Closely related to the practical application of courses of hygiene is the subject of clothing of school children. A clarion call for a crusade in this field was sounded by Dr. Alice M. Burns, who said:

"Most of the minor defects which arise in school life as the result of wrong habits of breathing and bad habits of posture—the presence of adenoids and hypertrophied tonsils, lateral curvatures, round shoulders, contracted chests and all the varying degrees of lung impairment which owe their earliest initiation to the stultifying, deteriorating effects of an imperfect thoracic development—would be materially diminished both in frequency and degree by the advent of a universally adopted rational school outfit."

There seemed to be a general feeling that infrequently the teaching of hygiene is not sufficiently linked with its actual practice. "The hygienic conscience seems to be acquired almost unconsciously if the environment is uniformly hygienic. The only rational order appears to us to be—live hygiene—learn hygiene—teach hygiene," says Mrs. E. Adais Impey.

The discussion of the subject of rural school hygiene stressed the fact that the physical condition of suburban scholars was in a more precarious state than that of urban children. This statement is especially significant to us here as it verifies the recent findings of the special committee of the National Education Association (Dr. T. D. Wood, chairman), in which it was declared,

after a careful survey of the physical condition of school children in the rural districts of a number of states, that the percentage of defects is on the whole higher in the country than in the city.

A plea was made for a more adequate inclusion of the related topics of Domestic Science in the school life of the girl. Quite incidentally, the discussion brought out the urgent need of lengthening the compulsory school period from fourteen to sixteen years, a principle already being actively urged by the National Child Labor Committee in our own country. This, it was alleged, was necessary in order to better prepare children for the stern and uncompromising realities of life.

Among other things the following topics are also discussed: Diet; Cookery; Hygiene under the Provision of Meals Act; The Administration of the Act; Social and Educa-

tional Aspects of School Meals; Life and Diet of Primary Scholars; How Far is Feeding of Children an Educational Function; Teaching Personal Hygiene in School; Teaching Cookery; Open Air Schools; Diet of Country School Children; Malnutrition—its Causes and Consequences; Clothes and the Child; Institutional Housekeeping.

The volume recalls what Lord Beaconsfield once said:

"The health of the people is really the foundation upon which all their happiness and all their powers as a nation depend; but if the population of that country is stationary or yearly diminishes in stature and strength, that country is doomed."

Edward E. Brown.

Superintendent, Bureau of Welfare of School Children, New York Association for Improving the Condition of the Poor.

The Source, Chemistry and Use of Food Products. By E. H. S. Bailey, Ph.D. P. Blakiston's Son & Co., Philadelphia. Illustrated. 517 pages. Price \$1.60 net.

In this book we have included an account of the production or manufacture of various foods, essential statistics relating to them, an elementary characterization of their composition, and a body of hygienic doctrine. These have been brought within a moderate compass with remarkable success. The best authorities are freely cited. The style is clear and agreeable. Almost anyone will gather interesting information by the most casual browsing and the attractiveness of the presentation will hold him to his reading longer than he intended. The well-chosen

and unfamiliar illustrations are most helpful.

The discussion of the values of different foods for human nutrition is free from dogmatic assertions and temperately conducted. The economic necessity rather than the assumed danger of preserving foods by all possible methods is properly emphasized. A careful distinction is made at every point between injurious defects of food and those which are merely fraudulent. The book can be unreservedly commended.

Percy G. Stiles.

HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS.

Calgary, Alberta.

The annual report of the Department of Health of the city of Calgary lends itself well to popular education in health matters and public instruction in the work of the local authorities. The report of Medical Health Officer S. Mahood is especially creditable from the standpoint of educational work. A remarkable spirit of progress and activity is manifested throughout.

Among the more important improvements introduced during the year are a baby milk station, dairy inspection, a city laboratory, a new refuse incinerator, and some new sanitary laws. Recommendations for improvement include an amplification of the isolation hospital with provision of a unit system for different diseases, since there has been trouble with cross infection; the employment of a visiting nurse to assist the bureau of tuberculosis; the continuation of the baby milk station during the whole year; the introduction of general educational work regarding venereal disease; a law requiring birth reports within twenty-four hours; a new water

supply or filtration; a housing survey; and free public baths.

That the work of the department has been effective is indicated by a drop in the death-rate from 14.29 in 1912 to 11.86 in 1913, while the infant mortality rate also decreased from 173.0 to 130.0 per thousand births. The latter is attributed to the work of the baby dispensary and milk station and the work of the infant hygiene nurse. During the summer months when the milk station was in operation there was a decrease of 55 per cent. in the rate. The control of the milk supply is being made much more complete by inspection of dairies and creameries and by taking samples and excluding bad supplies. The contagious disease situation also shows general improvement, but medical inspection of schools is pointed out as being essential to the complete control of children's diseases.

As to the form of report a financial statement and the International System of classification of deaths are among the desirable improvements.

Lynn, Massachusetts.

The Board of Health of Lynn presents a well prepared report for the year 1913. Lynn has a population estimated at 95,000 and a considerable percentage of foreigners. In view of the somewhat unfavorable sanitary situation, as it would naturally exist, the death-rate of 11.92 is an extremely creditable figure, and the fact that it is below the Massachusetts average may be set opposite the fact that the annual per capita expenditure (\$1.21, including refuse disposal and hospitals) on health work is considerably above the mean expenditure in the state.

Improvements in equipment and methods introduced during the year include more

thorough inspection of public eating places and enforcement of the rule that all, including the lunch carts, be connected with water and sewer; appointment of a veterinarian as inspector of slaughtering animals with consequent removal of this work from the province of the milk inspector who has also been supplied with an automobile and has thus been enabled to make more frequent inspections of dairies, stores, and milk rooms; additional room in the tuberculosis sanatorium and hospital for contagious disease; in the schools, the establishment of special clinics for the treatment of disorders of the eye, ear, throat, nose, teeth, and skin, and enforce-

ment of compulsory vaccination on the basis of the belief that no permanent cause for exemption is recognized; inauguration of a campaign of popular education by a series of bi-weekly lectures in the high school auditoriums, "covering the entire field of hygiene," for the benefit of parents and teachers, and the exhibition of lantern slides with accompanying lectures in the moving picture houses.

Recommendations for further improvements include increased provision of better service for waste collection and disposal; an increase in the interest of citizens in the appearance of the streets, the installation of at least three comfort stations in the city; transfer of the granting of licenses for public eating places to the board of health; additional

hospital accommodations for contagious disease; and the employment of additional school nurses.

The report of vital statistics gives some very interesting tables; the comparison of conditions during recent years being unusually complete. No figures on births during the year are printed and the infant mortality rate is omitted also. The classification of deaths by causes might also be made more complete with good effect and without using additional space. Reports of employees, other than that of the city physician who is a member of the board of health and those of the medical inspectors of schools, are almost wholly statistical and would be much more valuable if they were made instructive rather than formal.

DEPARTMENT NOTES.

Culture Incubators in Police Stations.

In the September issue of *The Modern Hospital* Commissioner Young of the Chicago health department tells of the Chicago plan of using the police stations as culture stations. The plan is successfully used in other cities and is in many ways preferable to the drug store culture station system. We quote a part of Dr. Young's remarks:

"In handling diphtheria cultures, it has for a number of years been the practice of the Chicago health department to make use of the police stations as points of collection for diphtheria culture tubes, and of the police messenger service as a means of transportation from these points to the laboratory. The enormous area covered by the city of Chicago made some such method imperative; otherwise delays of a day or two might easily result from the time the culture was made to its being received at the laboratory, it being entirely impossible for the department to finance any system of collection from drug stores or other points of deposit. This method proved quite satisfactory, but still involved considerable delay between the time of taking the specimen and the time that it could be placed in an incubator in the department.

"In the fall of 1913 the department determined to install incubators in all the police stations. We accordingly purchased forty-one electrically operated incubators (Fig. 1), each with an inside measurement of 10 x 10 x 10 inches, and two incubators 24 x 18 x 17½ inches inside measurement. The price of the small size was \$15 and of the large size \$45.

"We installed one of the small size in each of the police stations, except two stations where the character of the neighborhood and the size of the district necessitated the use of the larger size. The incubators were installed in such a way as to present a neat appearance, and are kept in accurate operation by means of an inspection service.

"The messengers make from one to two trips a day from each police station to the city hall, depending on the amount of business done by the precinct. As the hour at which the culture is received at the police station is stamped on the package, the clerk receiving the cultures at the laboratory is able to tell at a glance whether a further incubation period is necessary. In a large majority of instances no further time is necessary, and it is possible to pass the specimens on to the bacteriologists for examination as soon as they are received."

Requirements for Public Health Nurses.

The Public Health Council of New York state, organized under the Laws of 1913, issues the following statement:

"In regard to the public health nurses, the law provides that:

"The commissioner of health, whenever he may deem it expedient so to do, may employ such number of public health nurses as he may deem wise within the limits of his appropriation, and may assign them from time to time to such sanitary districts and in such manner as in his judgment will best aid in the control of contagious and infectious diseases and in the promotion of public health.

"For supervising public health nurses the Public Health Council has established the following qualifications:

"1. They shall be registered nurses;

"2. They shall submit evidence, satisfactory to the Public Health Council, of training and experience of not less than two years after graduation, in one or more of the following lines of work: a, maternity work; b, infant welfare work; c, social service; d, tuberculosis work; e, care of communicable diseases, and f, school nursing.

"3. They shall be, when appointed, not less than twenty-five years of age.

"For public health nurses (other than supervising nurses) it is provided that:

"They shall be registered nurses twenty-one years of age at the time of their appointment."—*The Dietetic and Hygienic Gazette*, September, 1914.

The Making of Health Officers.

The following article by Assistant-Surgeon General Trask is clipped complete as it appears in *Public Health Reports* of September 4. The idea suggested is already carried out to some extent by the state health authorities of Kansas and New York but hitherto has not been systematized as Dr. Trask suggests nor come into very general popularity since the greater part of the work offered in both states consists of laboratory and class work instead of correspondence courses and the average underpaid health officer cannot afford to give up a week of time and the expense of traveling to the work.

"In the United States at the present time one of the greatest handicaps to rational and effective health administration is the lack of knowledge of public health work and of the control of disease on the part of many local health officials, and especially those of small cities, villages, and rural communities. This lack of knowledge is in most instances not due to unusual ignorance but rather to the fact that there are exceedingly few men with requisite training from among whom the thousands of local health officers can be appointed.

"It would seem practicable, however, for the state health department, through a correspondence course, to give a very serviceable and quite satisfactory course of instruction to its local health officers. It would be possible in this way to use in villages and townships men who had had no medical training but who, after a year's correspondence course, would perform the duties of township or village health officer in a way superior to previous incumbents. Such a correspondence course might be arranged by the state health department sending out each week to the local health officers of the state a printed or multigraphed lesson on some single point in the control of disease. Such a lesson should not be so long that it would tax the patience or the limits of concentration of the health-officer students. It should cover but a single circumscribed topic, so that each week the local health officer would learn some definite thing which would be useful to him in his work. The time taken for such a lesson would not be great. Lessons could be sent out at weekly intervals and thus spaced they would not crowd each other nor obliterate those previously learned. In a year's time the health-officer student would have learned fifty-two lessons and would have mastered fifty-two ideas regarding the control of disease. Most local health officers would in the course of one, two, or three years' instruction in this way become competent and efficient, and superior to most of those at present obtainable. Not only that, but those without previous medical training would, in townships and villages, become probably more efficient and satisfactory health officers than some of the physicians who are holding these

positions at the present time, for the medical man without other training, be he never so capable as a physician, knows but little more about the community control of disease than the person without medical training. The nonmedical health officer would eliminate, too, the embarrassing complications arising from the unfortunate custom of making practicing physicians health officers in villages and rural districts where, in performing their official duties, they are placed in the position of interfering with the practice of competing practitioners.

"Not only would such a correspondence course improve to a large degree the efficiency of local health officers, but it would constitute one more link to bind the various health units into an effective health organization.

"In carrying on such a school it would be highly desirable to hold examinations at the end of the year on the lessons that had been sent out during the previous twelve months. These examinations could be held on the occasion of the annual conference of the local health officers of the state. Those passing a satisfactory examination might be given a certificate. The course should be progressive, each year taking up new subjects. The subjects treated the first year would serve for beginners year after year. The health officer who had taken the course for several years, had passed satisfactory examinations, and held certificates to that effect, would naturally make a much better health officer than those who had not had the course. Preference might be given to those holding such certificates.

"The purpose of a correspondence course of this kind would be to have those acting as local health officers in small communities acquire some knowledge of public health administration without effort and without perceptible labor. There would, however, be many who would become interested and wish to go deeper into the subject. For these a well-selected course of reading would be an invaluable supplement to the primary correspondence course. For those who undertook the reading course there might be available periodic (annual probably) examinations on the subjects dealt with in the volumes included. The satisfactory passing of this

examination should naturally receive proper recognition, and a special certificate or diploma might be issued.

"Undoubtedly many persons other than health officers would desire to take these correspondence courses because of their educational value. It would seem to be desirable to encourage this, and those thus taking the courses and passing satisfactory examinations might upon request be enrolled as members of a State Sanitary Reserve Corps. The members of such a corps would be frequently found of service and their enrollment would markedly add to their interest in local health affairs. They would be a source of strength to local health departments."

The Employment of Full-time Executive and Supervisory Medical Officers.

The following executive order, which is destined to have a far-reaching influence on the future organization and administration of the Department of Health, has been promulgated:

"Directors of bureaus who are in receipt of salaries of \$5,000 or more per annum, and assistant directors of bureaus, assistant sanitary superintendents, chiefs of divisions, and all other medical officers who are in receipt of salaries of \$3,000 or more per annum, are hereby declared to be full-time officers of the department, and, as such, are required to give their services to the department during the full working day.

"They shall not be allowed to engage in the general practice of medicine, or any other regular occupation or business. With the approval of the commissioner, they may be permitted to engage in public health work outside of the department, but the department retains the right to determine whether such outside work interferes with, or is prejudicial to, the proper performance of department duty, and, after due notice, may withdraw such permission at any time.

"A reasonable period (but in no case longer than four months from the date of the promulgation of this order) will be granted to men now in the service of the department to adjust their affairs to meet the requirements here stated." This executive order takes

effect September 1, 1914.—*Bulletin of the Department of Health of New York City*, August 22.

Chicago School of Sanitary Instruction.

Another plan for public health education is noted in the *Bulletin of the Chicago School of Sanitary Instruction* for August 29, as follows:

"Not least among the activities of the department of health is the work which is being carried on in the School of Sanitary Instruction.

"Since June 22, 1914, nearly fifty students from the Medical Department of the University of Illinois have enrolled for selective courses in the school, others being added from time to time; the students to devote three hours' time to the work selected, on Mondays and Wednesdays each week from 9 a. m. to 12.

"The students of the school are permitted to divide the time among such courses as they choose, some giving part of the time to work in the sanitary bureau, some to the laboratory, others to the contagious disease division or the food bureau at their own discretion, and again others taking the work in all of the bureaus of the department.

"The purpose of the school is to give those who desire an insight into the methods of public health work and to better fit them for a wider service in their professions. It should be explained that the courses are not confined to medical students, but are open to any who may desire to take them.

"A diploma is awarded to each student completing the course; and it is felt that the field of preventive medicine, into which channel the department directs these students' activities, will be enlarged in scope and usefulness, thus leading to the betterment of community conditions generally.

Canadian Treatment of Tuberculous Dairy Cattle.

The *Regina Health Bulletin* prints in its July issue the regulations of the Dominion Department of Agriculture respecting tuberculosis in dairy catalogue. The regulations

lay down the plans for inspection and licensing of dairies and the conditions under which the department will coöperate with a town or city in furnishing inspectors. We quote the section dealing with the disposal of cattle reacting to the tuberculin test, since this question is a problem in many countries.

"Following the examination and test, the diseased cows and reactors shall be dealt with as follows:

"(a) Cows which in the opinion of the inspector are affected with open tuberculosis and are distributing the germs of the disease through the milk, faeces or sputum, shall be sent to an abattoir under inspection and there slaughtered as soon as conveniently can be done. When no such abattoir is within reasonable distance, the cows shall be slaughtered in the presence of the inspector, who shall direct how the carcass shall be disposed of.

"(b) Reactors to the test shall be separated from non-reactors as effectively as possible (suspicious animals shall be classed as reactors), and the owner shall be given the choice of disposing of them in one of the following ways:

"(1) Immediate slaughter.

"(2) Slaughter after they have been prepared for the block, by drying off and feeding.

"(3) Retaining them in the herd, and selling no milk or cream until it has been pasteurized.

"Compensation shall be paid to the owner of the herd for all cows slaughtered under these regulations upon the following basis:

"(1) One-half the appraised value of the cow if destroyed as a case of open tuberculosis.

"(2) One-third the appraised value of the cow if destroyed as a reactor at the request of the owner.

"(3) Valuation shall be made by the inspector, and shall not exceed the maximum valuation for cattle as specified in section 6 of the Act.

The salvage from the carcass shall be paid to the owner of the cow in addition to the compensation, provided compensation and salvage together amount to less than the

appraised value; if more, the surplus shall be paid to the receiver general.

No compensation shall be paid to the owners unless, in the opinion of the minister, he assists as far as possible in the eradication of the disease by following the instructions of the inspector as to disinfection, etc."

The Milk Standard in England.

The *Medical Officer* of September 5 contains the report of a special sub-committee appointed by public health committee of the Lanarkshire County council to consider the question of milk prosecutions under the Sale of Food and Drugs Act. A large amount of work has been done already and while the work is not completed the following conclusions have been given out:

"First—In an ordinary herd individual cows do give milk containing less than 3 per cent. of fat.

"Second—The frequency with which this occurs depends to some extent on the milking intervals and the efficiency of the milking.

"Third—The number of cows consistently giving milk containing less than 3 per cent. of fat is very small.

"Fourth—In the usual method of distribution there is a possibility of a quantity of milk being sent off from the farm containing less than 3 per cent. of fat.

"Fifth—This possibility would be removed if the milk of the whole herd were

mixed together. The average quality of the milk of each herd was always above the standard of 3 per cent. of fat."

Street Cleaning and Public Health.

Municipal Engineering for September contains an interesting discussion of modern methods and results in street cleaning. The article considers the advantages of various kinds of pavement, the effect of street dust on the public health and comfort, and the methods of street cleaning now in use. Although opinions differ as to the immediate effect of street dust on public health, it cannot be denied that it is more detrimental and a greater nuisance than smoke which is receiving the attention of many health authorities. The fact that a city department is responsible for the street cleaning apparently makes action by the health department difficult, but certainly it is a matter worthy of serious consideration.

It is concluded by the author that wet cleaning is greatly to be preferred to dry and that machine cleaning is more efficient than hand cleaning although hand cleaning has its place.

"The system for cleaning streets of the future will be a combination of dry and wet methods; machine work at night and hand broom in the day time. White wings will only be used to remove coarse litter; the machines will take care of the dust."

PUBLIC HEALTH NOTES.

Report of British Committee on Bacteriological Examination of Water.

The new committee of the Royal Institute of Public Health, which was appointed to draw up a scheme of uniform procedure for the bacterioscopic examination, has just submitted its report. The report is published complete in the *Journal of State Medicine* for September. It says in introduction:

"The committee, having given careful consideration to the terms of their reference, are of the opinion that it is inexpedient to lay down hard and fast rules as to the number and kind of tests to be employed, as circumstances alter cases, and the procedure best adapted for one class of water may not be equally suitable for other waters. In all cases, however, the number of bacteria present in water should be estimated and the number of *Bacillus coli*.

"For these estimations, however, as many as possible of the following tests should be employed:

"(1) Number of microbes per cubic centimeter in (a) meat broth gelatin (or, when the climatic conditions render it necessary, meat broth agar), incubated at 20° to 22°C.; (b) meat broth agar incubated at 37°C. (Brands Essence of Beef or Lemco may, if desired, be substituted for meat broth in the preparation of these media (a) and (b); (c) lactose bile salt agar (Mac Conkey), incubated at 37°C. The medium may be tinted either with litmus or with neutral red according to the taste.

"(2) *Bacillus coli* test. In certain cases it is advisable to apply also—

"(3) *Streptococcus* test.

"(4) Anaerobic spore test (commonly known in England as the *B. enteritidis sporogenes* test).

"(5) Tests for pathogenic microbes. Test (1) (c), (3), (4), and (5) need be employed in special cases only."

The report goes on to recommend that gelatin plates be counted after four days' incubation, but that the 37°C. agar plates

and bile salt agar plates be counted in twenty-four hours. For the identification of *B. coli* the formation of gas in lactose peptone medium and the production of indol in a peptone medium are advised; the indol to be tested by the paradimethylaminobenzaldehyde method. The committee consider that judgment as to the purity of a water should be based primarily on the quantitative estimation of lactose + indol + microbes, although this need not prevent the utilization of the results of other tests as additional factors bearing on the position.

A tendency to give up the streptococcus test is shown and limits its consideration to those streptococci which yield acid in a lactose medium. The committee holds that a water should not be condemned on the streptococcus test alone if the *B. coli* and other tests are satisfactory. The anaerobic spore test is not considered to be as delicate as the *B. coli* and streptococcus tests, but there are cases where its application may yield useful results.

The appendix, prepared by Dr. J. W. H. Eyre, contains directions for the preparation of meat extract, nutrient gelatin, nutrient agar, glucose formate broth, bile salt agar, sugar media, bile salt broth, double or triple strength bile salt broth, milk, Drigalski and Conradi's medium (modified), and the solutions for the indol test.

Teeth and Disease.

"The Sixth International Dental Congress, which was held in London in August, has been followed with much interest not only by dentists but by the medical profession and others concerned with the problems of national health. The past ten years have witnessed a growing recognition by doctors and laymen of the importance of the teeth in relation to physical and even mental health and well-being. An attempt is now being made to foster systematic research into dental problems. It is agreed that a large number of disorders of the body are in origin due to defective teeth, dental caries, decay or

pyorrhœa. Whilst at present the subject of decay in teeth is fairly well understood, pyorrhœa, which is a condition of pus within the gum, still requires considerable investigation. It does not in its earlier stages manifest its presence by toothache, for instance, and the visible part of the tooth may be apparently sound; nevertheless the toxic substances of the disease may be exercising a deleterious effect on the whole body. Chronic joint affections and certain rheumatic conditions are largely of toxic origin, and the mouth is an easy source of infection. Medical men today frequently send rheumatic patients to the dentist, who in many cases provides the cure. Some striking instances of the effect of dental operations are recorded. A man who had suffered from insomnia for seventeen years had three teeth extracted; within a week he enjoyed normal undisturbed sleep. A patient suffering from eye trouble had some teeth removed and found that his eye trouble disappeared. A woman subject to mental disorder was sent by a distinguished alienist to a dental surgeon in order that, as a preliminary to treatment, the toxic influence of bad teeth should be removed. The public, too, are recognizing the importance of teeth; in some degree this may be due to the institution of dental inspection in elementary schools. There can be no doubt that a periodical inspection of the teeth is a wise step worthy of the public consideration, and it will not be a surprise if in the near future national dental clinics are set up and state provision made therefor."—*Journal of State Medicine*, September.

Difficulties in Quarantine.

"One of the difficulties in preventing the spread of contagious diseases is that of maintaining proper quarantine. The primary purpose is to protect members of the community from acquiring the disease; if there was nothing else to consider, that would be comparatively simple.

"The quarantine should be such as to give the maximum protection with the minimum of inconvenience and expense. Unfortunately medical science has not advanced to the point that enables us to act with complete knowledge. There are

many diseases, such as measles, scarlet fever, smallpox, and anterior poliomyelitis, the causes and carriers of which we know nothing. Consequently we establish rules which we hope will bring about the localization of the contagion, and, for fear lest something escape our precautions, the quarantine is continued for weeks. In many instances this is entirely unnecessary, as recent investigations concerning measles indicate that the chief infectious period is probably during the coryza stage before the diagnosis has been made. Yet some three weeks must elapse before the family is released from quarantine. In some cities the authorities are distinctly skeptical in regard to the necessity of a six weeks' isolation for scarlet fever, but it is enforced. Another factor that has to be considered is that of the transmitters of the disease. When we know how diseases spread, we are in a much better position to handle the outbreak. The methods of attacking yellow fever have been revolutionized since the discovery of the carrier. As long as there are no mosquitoes to bite the sufferer and carry the contagion, the disease is not as dangerous as typhoid fever. In regard to plague, too, it has been found that the rat and rat fleas are the conveyors of the bacilli, so our efforts are directed against them.

"At present there is a general tendency to make quarantine as simple and as little burdensome as possible. No one cares to be shut away from his fellow men; but what is more important is the interference with the bread winners. Unless our laws can be modified considerably, the public must make better provision for care of the family involved."—*New York Medical Journal*, August 29, 1914.

Plumbing and Health.

Many people have curious ideas about the relation between disease and poor plumbing. This clipping from the *Journal of the American Medical Association*, for August 29, states in a very lucid manner the fallacy of these opinions:

"It is not surprising perhaps that old ideas concerning the causes of disease survive in some strata of society a long time

after these ideas have been generally outgrown or discredited. All the same it is a little disconcerting to find that typhoid fever can still be complacently attributed to bad plumbing. When we read that 'insufficient laws regulating plumbing and sanitation in Virginia, Maryland and the District of Columbia are largely responsible for the high typhoid rate and the prevalence of other diseases in the two states and the district,' and again that 'much of the fever and other forms of disease with which the health authorities are constantly wrestling is caused by noxious gases and vapors emanating from neglected or defective pipes in the homes of the people,' we are inclined to rub our eyes and ask ourselves if the education of the community is really proceeding at the pace we sometimes like to believe. The assertions quoted above, however, were reported as made at the Association of Plumbers, Gasfitters and Steamfitters which recently met in Richmond, Va., and not at a convention of health officers of physicians.

"It is hardly necessary to point out that typhoid fever—or any other fever—is not caused by bad smells, and that the small quantity of the gases of decomposition found in well-ventilated sewers has never been proved to exert any injurious effect whatever on health. A connection between plumbing and health has been shown to exist at just one point. Plumbing is of value to public health only so far as it removes human excreta from the immediate neighborhood of dwellings and so does away with the danger of fly-borne typhoid and other infection which arises from allowing infectious material to accumulate in family privy vaults. Disease germs are not found in sewer air; indeed, it is difficult on physical grounds to see how they could get there. The 'noxious gases and vapors,' so dear to the plumber's imagination, are conspicuous by their absence in all perfectly constructed sewer systems, as every visitor to the great sewers of Paris and other modern cities well knows. 'Defective plumbing' has about as much relation to public health as any other mechanical defect in house construction.

"On the financial aspects of modern city plumbing ordinances we prefer not to dwell

at this time. It is a well-recognized fact that these ordinances are drawn with no uniformity in our American cities and that what is required in one city may be prohibited in another. High authorities maintain that the system of modern house plumbing which is made legally obligatory on house-builders in many places entails a large, needless and altogether unjustifiable expense. Conceivably it is to the financial interest of plumbing supply houses—or somebody—to have the required system of plumbing as elaborate and as expensive as possible.

"One feature of this situation deserves attention. It is plain that the most serious obstacle to the universal replacement in sewered towns of the dangerous privy-vault by the water-carriage system is the high cost of the plumbing. In this respect every unnecessary refinement and elaboration in plumbing outfits and legal requirements is a harm, not a help, to public health. The greatest possible simplicity and cheapness compatible with efficiency is what is needed in really 'sanitary' plumbing, not a labyrinth of traps, vents and back-vents. If the plumbing interests really wish to aid the hygienic welfare of the community they can best do this, not by insisting on still more complicated devices and 'inspections,' but by simplifying and cheapening the cost of installing and maintaining the pipes and fixtures essential for carrying off the house wastes in a speedy and inoffensive manner. Finally, let us ask this question: To what extent do the plumbing ordinances on our American cities represent the prevailing opinion of public health experts and trained health officials, and to what extent do they represent the efforts of commercially interested individuals or organizations to entrench themselves behind the active if not always well-informed desire of the people to safeguard the public health?"

Economy and Efficiency in Comfort Stations.

The American City for August contains an interesting study by D. B. Armstrong, acting director of the Department of Social Welfare of the New York Association for Improving the Condition of the Poor. Dr.

Armstrong has made a study of comfort stations, both here and abroad, and the article will prove interesting and valuable to those who have the problem of comfort stations to deal with. The article is reprinted by the Civic Press, 87 Nassau Street, New York, as one of the American City Pamphlets.

The discussion takes up the economical management of comfort stations and compares methods of operation in various cities. New York spent \$52,000 during 1912 on the maintenance of the nine stations under the control of the Department of Public Works and received practically no revenue in return. Birmingham, England, on the other hand expends about £3,000 a year on comfort stations and not only pays expenses but clears a 10 per cent. profit on the investment. This is done by having a considerable proportion of pay toilets and by selling soap, combs, hair and clothes brushes and clean towels. Other cities receive a revenue from the sale of concessions such as boot-black stands, parcel rooms, etc.

Comparisons are given on the sanitation of comfort stations, the use of the washing facilities when hot and cold water was supplied and when only cold was available, the variation in washing depending on the supply of individual towels, common towels and no towels. The use of swing doors with locks operated by the foot is mentioned as preferable to doors requiring the handling of a knob or lock; automatic flushing devices are urged also to prevent possible infection by means of the handle. Another possibility mentioned as adding to the efficiency of the station is the installation of an information bureau for the benefit of strangers.

A Salaried Medical Profession.

The *Detroit Medical Journal* of July comments editorially on the much-discussed question of subsidizing the medical profession in the interests of public health, as follows:

"Professor Vogt, in an article contributed to *Popular Science Monthly*, makes a plea for a salaried medical profession. Attention to public health, he says, presents two aspects, the one preventive, intended to preserve

health, by removing the causes of disease; the other curative, and intended to restore to health those who have fallen ill. Under existing conditions he argues, the physician has no direct financial interest in warding off disease from those who are well. His efforts are therefore directed towards the cure rather than the prevention of disease. Under the present system the physician is prosperous in inverse ratio to the health of the community. To this we assent. Then the writer draws the conclusion that since the physician today receives his reward from the curative side of medical practice he is not professionally interested in the prevention of disease; with which conclusion we heartily disagree. Whatever has been accomplished in the preventive medicine has been the work of the medical profession. Problems of immunity and the study of such pathologic conditions as typhoid, tuberculosis, yellow fever, have been the work of individuals in the profession and their work has been made effective only with the coöperation of the rank and file of the profession. Professor Vogt feels that were the medical profession paid by the public the matter of preventive medicine would receive adequate attention. 'Were physicians paid by the state, they would not fear the loss of income through working for the well, while at the same time attending to the ill, because the lessening of illness would not necessarily interfere with their incomes.' This view of the matter appears amusing to the physician or surgeon who is accustomed to treat the pauper with as much care and solicitude as the rich. It is doubtless if salary from the state would alter in the least the attitude of the true physician towards those intrusted to his care. Then Professor Vogt comments upon what he calls the dissatisfaction over charges made by physicians. 'It places the burden of caring for the sick poor upon the sick well-to-do because the physician must make his charges according to the net income desired.' It would be nearer the truth to say that the physician as a rule makes a uniform charge for his services and treats the indigent free of charge. From the article it is inferred that the indigent sick are cared for out of the charity of the rich, which is certainly not the case.

Any charity extended is given by the physician himself.

"It is difficult to see how the condition of either public or physician is to be improved by a salaried medical profession even if it were possible to devise a practical scheme for adjusting the salaries or persuading legislatures and civic bodies that the necessary appropriations should be made from the budgets.

"The time is ripe, however, when the individual efforts of the medical profession could be made more effective for the prevention of disease by a national health department and more adequate state and local organization."

The Sanitary Officer in War Service.

An interesting article on the war-time duties of the officer of the sanitary corps is presented in the September issue of the *Military Surgeon*. The following brief review is clipped from the *New York Medical Journal*:

"The article contains some surprises for the general practitioner who is unfamiliar with the mass of non-medical knowledge which the army surgeon must master in addition to his needful professional knowledge. The sanitary officer, it appears, is first a military officer and secondly a medical man; his responsibility is as great as that of any other officer, although the performance of his duties may be less spectacular. In addition to maintaining the health and efficiency of the troops in camp and on the march, and attending to the sick and wounded and their transportation to points where they may be patched up for duty, the sanitary officer must not only read and interpret topographical maps, but be prepared and equipped to sketch a map himself. This enables him to calculate the time required for troops to cover certain distances and to dispose of his sanitary forces accordingly. The chief surgeon should know exactly the size, location, and transportation facilities of the sanitary troops under his orders. He will ascertain the probable location of casualties, taking under consideration the terrain, time, distance, weather and climate conditions, as well as the presence of streams, wells, and other water supply, the location of buildings or

shelter for wounded, the availability of wagons for their evacuation to the rear, in fact anything which may play a part in the work of the sanitary troops. The ideal disposition of sanitary units and their appurtenances, such as first aid stations, dressing stations, ambulances, field hospitals, etc., is that which enables them to be always within reach, yet never in the way. The latter is a most important point and an ill considered move may have the greatest consequences."

Recent Studies on Pellagra.

Public Health Reports for September 11 contains three reports on the studies of pellagra now being carried on by the United States Public Health Service. The first, by Dr. Goldberger, surgeon in charge of pellagra investigations, indicates that pellagra is not infectious and, as a result of studies in various institutions, says that "the inference may be safely drawn that pellagra is not an infection but that it is a disease essentially of dietary origin; that is, that it is caused in some way such as, for example, by the absence from the diet of essential vitamins, or possibly, as is suggested by Meyer and Voegtlin's work, by the presence in the vegetable-food component of excessive amounts of a poison such as soluble aluminum salts."

Dr. W. F. Lorenz reports some experiments carried on at the Georgia State Sanatorium on the treatment of pellagra by overfeeding. He says that conclusions are not warranted by the work thus far completed, but "that a generous diet seems to have a decidedly favorable effect upon the course of pellagra." Another report by Dr. Lorenz deals with the cerebrospinal fluid in pellagra and offers the following conclusions:

"1. A lymphocytosis of the cerebrospinal fluid does not occur in uncomplicated pellagra.

"2. Globulin excess of the spinal fluid is only occasionally observed.

"3. Lange's colloidal gold chloride test is uniformly negative in pellagra.

"4. The Wassermann is negative with a few exceptions. In this investigation the exceptions were moribund cases which gave weakly positive reactions with blood serum.

"5. The spinal-fluid findings would seem inconsistent with a conception that pellagra is an infectious disease of the central nervous system."

Effect of Hypochlorite on the Teeth.

An interesting letter from C. A. Jennings, a consulting engineer of Chicago, is published in the August 22 issue of the *Engineering Record* touching on a new phase of danger from the use of hypochlorite. We quote complete:

"Hypochlorite treatment of water supplies has been blamed for many real and imaginary grievances. Many of these have been the result of prejudice against this form of water treatment. Among other things that have been laid to hypo might be mentioned the killing of goldfish, the fading of the beautiful red color of roses, the causing of grass to die when sprinkled with hypochlorite-treated water, the bleaching of the pretty locks of women and the making unfit for coffee or tea of water treated with hypo.

"A recent work on occupational diseases mentions the injurious effects of chloride of lime upon the enamel of the teeth of workers in bleaching industries and plants making chloride of lime. Hypo has been used at the Bubbly Creek filter plant since August, 1908, and is bought in carload lots of 350- and 750-pound containers. Previous to 1908 I had had but little trouble with my teeth. Since that time I have averaged about three sessions of two or three weeks each, during each year, with my dentist. Many of the cavities are of the marginal type.

"My assistant, who has been with me for more than two years, has had identically the same experience. Former assistants, while in my employ, had sessions with dentists. One of my laborers, who had never seen a dentist's chair previous to working at the Bubbly Creek filter plant, had six or seven teeth filled after about six months in this work.

"I do not believe that this condition can be blamed on the air or odor that prevails here at the stock yards, which is well known. It would be interesting to learn from others engaged at plants where hypo is used in

water treatment whether or not these conditions have prevailed. It is possible that many have been looking for the culprit all this time and have been investing in various mouth washes, tooth pastes and powders, whereas hypo has been the hidden danger."

Teaching Food Values in the School.

The *Weekly Report* of the board of health of Cincinnati makes the following suggestion in regard to a means of reducing the high cost of living:

"Apropos the government's investigation of the high price of food materials incident to the European war, it is a matter of no small moment that our citizens should know how to maintain the human machine and, in time of trouble, what is best and cheapest in order to keep the human parts together.

"Noted physiologists have prepared tables setting forth the needs of adults and growing children and how these requirements may be met. Little pamphlets calling attention to these needs, suggesting a variety of menus and the food value of each article, might be distributed in the homes through the agency of the board of education or the department of health. Can we not have on the class-room blackboard a short explanation of food values—say of one or two articles a week? For example: the food value of a dish of beans over pineapples.

"The government could give information with regard to all staple commodities and foodstuffs sold in packages. The manufacturer should be forced by law to label his product in terms of calories, and he should be prosecuted for selling material of a different character than the standard deposited with the Government.

"If, through the medium of the Penny Luncheon Association the schools, public health agencies and the press, knowledge regarding food requirements and values is disseminated in the homes, then no one in poor circumstances will spend his money for a can of tomatoes which is little else than flavored water.

"When the boy sees on the blackboard that the oatmeal bought for a penny has more growing and fighting stuff in it than a barrel

of pickles, it will stimulate him in getting his money's worth. The lesson will probably be reflected in the home."

Camp Sanitation in Africa.

The *Tropical Diseases Bulletin* for August 15 describes a novel method of excreta disposal which is used in Africa. The method is based originally on the plan required by the Mosaic law (Deuteronomy xxiii, 12, 13) and developed from the fact that the scrupulous Mohammedans follow this law and cover their excreta. Many will not take the trouble to dig holes for use but will use them if provided. The plan as applied to construction camps is as follows:

"A place is marked off in a field, conveniently close to the works—say, not exceeding 100 yards distant—by means of four flags. Within the square space so selected are made pits, at distances of three feet from each other. These pits measure six inches in diameter, and eight inches in depth. On one side of each pit is placed the earth excavated from it, and a piece of split bamboo two feet or so high, having a small colored rag at the end, is fixed at the same side as the piled earth. On the side nearest the works is placed, so as to preserve the sitters from observation, a moveable screen, which may be made of jungle tree branches intertwined with any foliage that will secure protection from sight. It is necessary to retain a man on duty on the site throughout the working hours. . . . He will see that defaecation occurs in the holes only. The moment a person retires, it is the attendant's business to proceed to the hole used, and remove the split bamboo—showing that the hole is not to be again used—and with the movement of his foot to throw the earth, piled as stated above, into the pit. If the attendant be too 'nice' to do this himself, there is no reason why, without much pressure, he should not be able to convince the person who has used the pit, that it is his duty to move the earth with his foot, and thus cover the excreta.

"The method gives considerable privacy, as any hole can be chosen, and any position assumed, and as the arrangement is cleanly and odorless, there is nothing to offend the sense of sight or smell of the user. It is,

necessarily, not a method that can be relied on in rainy seasons, and presupposes plots of ground readily penetrable such as are found in fields that have been cultivated. The method worked in connection with any institution having arable ground at disposal, so as to use plot after plot of ground, would place excreta economically in the best possible position for quick nitrification, and enrich the ground for subsequent cultivation."

Graduate Courses in Public Health.

From the "educational number" of the *Journal of the American Medical Association* we copy the following statement in regard to graduate courses in public health:

"Graduate courses in public health have been established in connection with seven medical schools leading to a degree of Doctor of Public Health (Dr. P. H.), Certified Sanitarian (C. S.), Master of Science in Public Health (M. S. (P. H.)) or Master of Public Health (M. P. H.). The course is for one year except at the Universities of Michigan, Minnesota and Wisconsin where the course for the Doctorate covers two years. Wisconsin gives a Diploma in Public Health (D. P. H.) for a one-year course. These colleges are as follows:

MEDICAL COLLEGES GIVING COURSES IN PUBLIC HEALTH.

Name of college.	Course started in.	Degree granted.	Years in course.	Degrees required for entrance.
Univ. of Penn. Sch. of Med.	1909	{ Dr. P. H. . . . C. S.	{ 1 1	{ M. D. A. B. or B. S.
Med. Sch. of Harvard Univ.	1910	Dr. P. H. . . .	1	A. B. or B. S.
Univ. of Mich. Dept. M. & S.	1912	{ M. S. (P. H.) Dr. P. H. . . .	{ 1 2	{ A. B. or B. S. and M. D.
Univ. of Wis. Med. School.	1912	{ D. P. H. . . . Dr. P. H. . . .	{ 1 2	{ M. D. M. D.
Detroit College of M. & S.	1913	M. P. H. . . .	1	M. D.
Univ. & Bell. Hosp. M. C.	1914	Dr. P. H. . . .	1	M. D.
Tulane Univ. Sch. of Med.	1914	Dr. P. H. . . .	1	M. D.
Univ. of Minn. Med. School	1914	Dr. P. H. . . .	2	M. D.

"Better Mothers" Contest.

A variation, and a rather desirable one in theory at least, from the usual baby contests

is that described in the *Buffalo Sanitary Bulletin* of August 31:

"Arrangements are in progress for a Better Mothers contest under the auspices of the Buffalo Department of Health. The mother will receive the prize and will be judged for the care given her baby, resulting in its excellence, in physical proportion, muscular development, respiration, circulation, digestion, general intelligence and self control.

"From present indications the entry list is expected to be very large, with a keen and interesting competition. It will be open to the public.

"All mothers whose children obtain an average of 85 per cent. will receive a certificate of Proficient Motherhood. The score card of the American Medical Association will be used."

PERSONAL NOTES.

The following persons were elected to membership in the Association September 15, 1914:

George McCrary Boteler, St. Joseph, Mo.
Dr. E. W. Brown, U. S. S. *Raleigh*, via San Francisco, Cal.

Dr. Charles Chauncey Duryee, Schenectady, N. Y.

John Boyle Gordon, Buffalo, N. Y.
Dr. Richard H. Harte, Philadelphia, Pa.
Dr. Fred Johnson, Eau Claire, Wis.
Prof. Max Levine, Ames, Iowa.
Burton Lowther, Kansas City, Mo.
James F. McCrudden, Philadelphia, Pa.
Dr. William D. Richmond, Knoxville, Tenn.
W. Voorhees, Jacksonville, Fla.

The municipal officers of health in the counties of Haldimand, Wentworth, Norfolk, Brant, in the province of Ontario, have organized an association and elected Dr. Thomas A. Bertram, Dundas, president, and Dr. James Roberts, Hamilton, secretary.

The Secretary of the Treasury, on recommendation of the Surgeon-General, U. S. P. H. S., has appointed Dr. Eugene F. McCampbell, Columbus, secretary of the Ohio State Board of Health, collaborating epidemiologist, in the United States Public Health Service.

Dr. Willard J. Denno of 14 Central Park W., New York City, and Dr. Charles White Berry of 572 47th Street, Brooklyn, N. Y., have been appointed sanitary supervisors of the State Department of Health of New York.

Dr. Denno after graduating from Yale

University and the College of Physicians and Surgeons of New York City, was house physician at the General Memorial Hospital and then entered into public health work, having been continuously in the Department of Health of the City of New York since 1910, where he now holds the position of assistant chief of the division of communicable diseases.

Dr. Berry graduated from the College of Physicians and Surgeons in 1896 and since 1898 has been a medical and sanitary inspector in the Department of Health of the City of New York. Dr. Berry has also had considerable experience in military camps, as a surgeon in the National Guard, and he is now a captain in the Fourteenth Infantry.

Dr. William T. Power of 152 Greenwich Street, New York City, has been appointed lecturer on diseases and disorders of the eye, in the State Department of Health. Dr. Power graduated from Detroit College of Medicine and has made special studies of eye diseases in the clinics of the New York Eye and Ear Infirmary and of the University of Vienna. He has taught ophthalmology in the University and Bellevue Hospital Medical College, and more recently in the New York Post-Graduate Medical School and since 1905 has been assistant ophthalmic surgeon to St. John's Hospital, New York City.

Mr. Charles Saville has resigned from the firm of Hering & Gregory, consulting engineers, New York City, and will spend the coming winter in Boston, taking a graduate course at the School for Health Officers of Harvard University and the Massachusetts Institute of Technology. His address will be Waban, Mass.

INDUSTRIAL HYGIENE AND SANITATION.

Experimental Researches in Methyl Alcohol Inhalation.

The following clippings are a partial quotation from an article in the *American Medical Journal* for September 12, 1914, entitled "Experimental Researches in Methyl Alcohol Inhalation," by H. H. Tyson, M. D., and M. J. Schoenberg, M. D., of New York. Since methyl alcohol is so widely used in various industries, the question of those working with it being poisoned and even worse, blinded, becomes a problem of industrial hygiene.

"Notwithstanding the earnest efforts of the ophthalmologists and the various committees for the prevention of blindness, to disseminate the knowledge of the poisonous qualities and effects of methyl alcohol, it is still a lamentable fact that many members of the medical and legal professions and the vast majority of the laymen, especially the workers using it, are either ignorant of or do not acknowledge the truth. The effect on the eyes and general health from drinking wood alcohol has been proved experimentally in animals, and has been corroborated in clinical practice; but the effect from its inhalation alone on the eyes has never heretofore been demonstrated experimentally.

"Although many clinical data have been collated tending to show an effect similar to the one obtained from its imbibition, many doubt and some dispute its power to effect the human organism deleteriously through inhalation alone. The wish to prove this fact, coupled with a desire in the interest of humanity to lessen the number of the blind and to conserve life, by advocating proper preventive or precautionary measures for workers using it, induced us to undertake these experiments. . . .

"The manufacturers assert that even admitting that commercial wood alcohol is poisonous, the refined product known as Columbian Spirits is not. We have proved conclusively that the refined spirit is quite as dangerous as the unrefined; and indirectly

more likely to destroy vision and life on account of the absence of the disagreeable odor to warn one of its presence."

"The contentions of the manufacturers that the refined methyl spirits are absolutely harmless are untenable and may cause many sad results among workmen by rendering them careless in taking proper precautionary measures while working with it. Many consider its inhalation harmless under ordinary ventilation. We take exception to that supposition. Most of our inhalation clinical cases result from its toxicity under what are considered by the workmen ordinary conditions. While ventilation will diminish the intensity of the toxicity, the inhalation will not be rendered absolutely harmless thereby. Not ordinary ventilation, but the very best obtainable is required for workers using wood alcohol. At least three times the ordinary air-space allotted per person should be allowed to each workman using it. Placards warning of the poisonous properties of wood alcohol should be posted in conspicuous places about premises where it is used, and hours of labor should be so arranged as to allow for exercise in the open air at frequent intervals. In our subacute cases while the exposure to the vapor for an hour or two daily had not much apparent untoward effect at the time, it certainly did have an effect which manifested itself later by subsequent weakness, trembling and unsteady gait in the intervals between exposures. We are inclined to agree with M. L. Poincaré, who found, after exposing animals to small quantities of vapor of methyl alcohol over a period of from eight to sixteen months, that considerable fatty degeneration of tissues occurred, especially in the liver, heart, muscle, epithelial cells of the uriniferous tubules, some cells of the lungs, and with congestion and slight inflammation of the meninges, and of some nerve centers. He concluded that the vapor of methyl alcohol in small quantities was dangerous.

"Physicians often fail to recognize industrial and occupational diseases because of the fact that they are often masked under the form of chronic disorders, which show themselves in obscure diseases of the digestive tract and nervous system, and are attributed by patients to other causes. A number of cases of methyl alcohol poisoning, to our knowledge, have occurred in which the causes of death were given as pneumonia, meningitis, heart disease, etc. Many of the milder cases have been treated for chronic gastritis, hepatitis, etc. It is not surprising that these unfortunate persons travel from one physician to another searching for relief, when we consider the unfortunate but sad truth that many physicians fail to grasp the true etiology of the cases.

"That a difference in susceptibility to methyl alcohol exists in animals and man cannot be denied, and this can be partly explained by the rate of oxidation which takes place in the animal or person. Those in which it is rapidly oxidized experience the least effect, while those with slow oxidation feel the greater toxic effect. Harnack concluded that methyl alcohol in slow oxidation formed formic acid, while in rapid oxidation carbon dioxid and water were formed. Hence when it is rapidly oxidized, it is comparatively (?) harmless, while in slow oxidation, which usually occurs in man, it is exceedingly toxic, as the action of the formic acid thus produced in the animal organism was much stronger than that of the pure formic acid introduced into the body, as in the latter case the organism attempts to convert it with bases and thus gives rise to formates."

"The laws relating to methyl alcohol should be enforced with a jail sentence as a penalty attached. Until the gravity of the situation is realized by our law makers and the judges in our courts, a certain number of manufacturers who value human life cheaply will continue to be a menace to society by disregarding the law and thus causing blindness and death."

Congress of the National Council for Industrial Safety.

As the JOURNAL goes to press the Third Annual Safety Congress of the National

Council for Industrial Safety is being held at the La Salle Hotel in Chicago. About 2,200 representatives of the council in various parts of the country have received personal invitations to attend and interested visitors are also welcomed. An interesting program is prepared but appeared too late to receive notice in the September JOURNAL. The congress opens on the 13th and closes on the 15th and will include, in addition to business meetings and committee reports, special sessions devoted to government, economics, industrial hygiene, transportation and public service, and for manufacturers. Round tables will be held on methods of inspection and on methods of educating workmen in accident prevention. Moving pictures on subjects related to the work will be presented from five to six each afternoon.

To Protect Laundry Workers.

"The Wisconsin Industrial Commission is doing work for accident prevention which is unique in this country, and which is as valuable as it is unique. Under the terms of the law creating it, the commission was empowered to make investigation as to what places are not safe, and to prescribe such safeguards and issue such orders as will make them safe. It was declared to be the duty of the commission to fix standards of safety and to formulate rules and regulations relative to the enforcement of such standards, which rules must be published for the use of all citizens who might be interested.

"One of the early acts of the commission was to appoint a committee on safety and sanitation, which included among its members representatives of employers and labor interests, as well as safety men and the assistant to the commission, Mr. C. W. Price. Besides setting standards for general protection, the committee has taken up special lines, such as elevators and laundries, and, in considering these special lines, it has called into consultation men who have had long experience in them and have devoted much attention to the matter of safety in connection with them.

"In adopting this plan, the commission has been the first state organization in this country to follow the excellent English ex-

ample of calling upon employers and workers to aid in fixing safety standards and formulating safety regulations. Such a plan is most likely to result in the drafting of standards which will be based on experience and will have a really practical value.

"The laundry orders, which went into effect some months ago under the two headings of 'Safety' and 'Sanitation,' deal with the special needs of laundries. Requirements regarding belts, pulleys, gears, set-screws, passage-ways, platforms, stairways, shafting, sprockets, and other points common to industries in general, are covered by general orders of the commission, issued at an earlier date."—*Safety Engineering*, September.

Personal Element in Safety Work.

"Accident-prevention work requires more diplomacy and tact than most people realize as it really resolves itself into a problem of changing men's minds. A man may make a valuable inspector in ferretting out dangerous conditions and devising ingenious safeguards to remedy such conditions, but at the same time not possess the necessary tact and skill in "teaching an old dog new tricks." After all dangerous mechanisms, such as gears, set screws, belts and pulleys have been guarded, it will be found that preventable accidents occurring through the carelessness of the employee will not be overcome to any great extent. The elimination of this class of accidents depends largely on the personality of the safety inspector, or those having the work in charge, in gaining the confidence and good will of the employees, and thereby obtaining the proper coöperative spirit.

"It is conceded generally that the older employees resent the safety idea more than the younger men, and it is only natural that this be true. After a man has operated a machine for a number of years without sustaining an injury, he naturally would feel as though it was a reflection on his ability to have safeguards applied. This condition is particularly found in small shops, and it requires some tact in approaching the employee and gaining the desired confidence. After such an employee is once won over to the side of safety, he will usually

prove a very ardent 'booster,' not only in preventing accidents, but in pointing out dangerous conditions. A spirit of coercion should always be assumed in preference to one of aggression, because the latter may have a tendency to arouse a spirit of hostility that will be impossible to overcome. It is far better for the patient to take the medicine from the standpoint of desire than that of compulsion.

"After convincing the operator that a guard should be installed, let him suggest the features of its design, and it is assured that he will feel more friendly toward its use and necessity. Everyone likes to see his own ideas perfected, and the operator, using the machine day after day, is usually acquainted with details that others are not. Such a procedure may require a longer period to perfect a safety organization, but in the end it will enlist 'boosters for safety' that will prove valuable links of the organization.

"An inspector should never assume a spirit of superiority among workmen, but rather one of equality and friendliness. By intimate contact with men, many dangers and hazards may be learned which otherwise would be passed unnoticed. As some one has aptly said: 'Get the men with you and the accidents will take care of themselves.'

"The aggressive spirit that tends toward hostility is perhaps more noticeable among state inspectors than those engaged in other branches of safety work, and the hostile feeling that is often aroused is due to the personality of the inspector and the method pursued. Very few states are accomplishing through their factory inspection departments the results that are possible, which is due mainly to the inspectors not entering into the spirit of coöperation and education, but, instead, looking at it from the angle of the law, and backed by legal authority. A manufacturer will enter into the spirit of the work with greater ardor if he is made to feel as though he were doing it because of right, and the saving derived because of better working conditions than from the feeling as though he were doing it because of external expressure. Unless inspectors are appointed that have the per-

sonality, and can win the confidence of both employer and employee, it is safe to say that accidents will not be reduced in the measure that the importance of the work deserves."—*Safety Engineering*, September.

The Industrial Drinking Water Problem.

The *Engineering Magazine* for September contains a short article on an economical solution of the industrial drinking water problem. In many factories no more provision for drinking water is made than what may be obtained from the tap or from a tank containing ice. In the summer the water from the tap is warm and unpalatable and there is constant danger of the possibility of disease from drinking dirty ice water. Therefore the following clipping seems to be a logical solution of the problem.

"Increased efficiency, larger production, health and satisfaction of employees, and reduction in time lost by them from productive work, all are secured when a bountiful supply of pure water is furnished workers. This is a thoroughly appreciated fact to managers of progressive plants and today the drinking water problem is a live issue in every industrial establishment.

"Various plans have been tried to secure a convenient, adequate supply of pure drinking water of the right temperature at a reasonable cost, but taking into consideration not only the initial investment but the expense of operation, most of them, such as stationary coolers, pipe lines without artificial cooling, stationary drinking fountains with water supply cooled by separate ice boxes, etc., have—as so many managers know to their sorrow—proved both expensive and inadequate and failed to meet the requirements of an ideal drinking water system

"This problem has been solved with remarkable success by the installation of a small refrigerating plant, water cooling tank, and insulated distributing lines with drinking fountains located at convenient points,—solved too at a total outlay of less than the operating cost for two years with the old bucket-and-dipper method. The new method applied in a steel mill in Pittsburgh has reduced the operating cost for supplying

drinking water, including cost of the water, to about \$1.82 per employee per year, from approximately \$5.00 per man by the old method.

The success of such a circulating system, however, hinges upon the insulation of the cooling tank and distributing lines, and too much attention can hardly be paid to the question of securing insulation of proper character and thickness."

Fire Hazards in Cleveland Lodging-Houses.

"The elimination of fire hazards in laborers' lodging-houses in Cleveland has been determined upon by Director of Public Safety Alfred Benesch. He found conditions of great danger—for example, the only egress from a bunk-house room in which nearly 200 men were sleeping was a curving stairway two feet wide.

"The director has started a campaign to do away with narrow and closed winding stairways, to have red lights displayed at all turns leading to fire-escapes, to secure the installation of fire-proof doors and concrete stairs wherever practical, to remove bars from windows leading to fire escapes, to have all main exit doors hung outward and to replace inflammable partitions by ones of corrugated iron.—*Survey*, August 22, 1914.

Compensation for Occupational Diseases.

In the *Public Health Reports* for August 21 is printed a review of a recent law enacted by the Province of Ontario, Canada, which supplements the provision for compensation of industrial accidents by regulations for compensation for occupational diseases.

"There would seem to be no good reason why a workman should not be compensated for physical injury produced by disease caused by his employment as well as for injuries due to accidents. In this connection the law enacted by the Province of Ontario, Canada, May 1, 1914 (4 Geo. V, chap. 25), is of interest for the reason that it not only provides for compensation in case of accidents but makes specific provision for compensation for industrial or occupational

disease contracted in the course of the workman's employment.

"The following are the sections of the act referring to this subject:

"100. (1) Where a workman suffers from an industrial disease and is thereby disabled from earning full wages at the work at which he was employed or his death is caused by an industrial disease and the disease is due to the nature of any employment in which he was engaged at any time within twelve months previous to the date of his disablement, whether under one or more employments, the workman or his dependants shall be entitled to compensation as if the disease were a personal injury by accident, and the disablement were the happening of the accident, subject to the modifications hereinafter mentioned, unless at the time of entering into the employment he had willfully and falsely represented himself in writing as not having previously suffered from the disease.

"(2) Where the compensation is payable by an employer individually it shall be payable by the employer who last employed the workman during such twelve months in the employment to the nature of which the disease was due.

"(3) The workman or his dependants if so required shall furnish the employer mentioned in the next preceding subsection with such information as to the names and addresses of all the other employers by whom he was employed in the employment to the nature of which the disease was due during such twelve months as such workman or his dependants may possess; and if such information is not furnished or is not sufficient to enable that employer to take the proceedings mentioned in subsection 4; that employer upon proving that the disease was not contracted while the workman was in his employment shall not be liable to compensation.

"(4) If that employer alleges that the disease was in fact contracted while the workman was in the employment of some other employer, he may bring such employer before the board; and if the allegation is proved, that other employer shall be the employer by whom the compensation shall be paid.

"(5) If the disease is of such a nature as to be contracted by a gradual process, any other

employers who during such twelve months employed the workman in the employment to the nature of which the disease was due shall be liable to make to the employer by whom the compensation is payable such contributions as the board may determine to be just.

"(6) The amount of the compensation shall be fixed with reference to the earnings of the workman under the employer by whom the compensation is payable and the notice provided for by section 20 shall be given to the employer who last employed the workman during such twelve months in the employment to the nature of which the disease was due and the notice may be given notwithstanding that the workman has voluntarily left the employment.

"(7) If the workman at or immediately before the date of the disablement was employed in any process mentioned in the second column of schedule 3 and the disease contracted is the disease in the first column of the schedule set opposite to the description of the process the disease shall be deemed to have been due to the nature of that employment unless the contrary is proved.

"(8) Nothing in this section shall affect the right of a workman to compensation in respect of a disease to which this section does not apply if the disease is the result of an injury in respect of which he is entitled to compensation under this part."

Industrial Respirators.

In the September issue of the *Engineering Magazine* is an instructive article by Sir Henry Cunynghame, on Industrial Respirators, particularly to be used where compressed air is available.

"Among the problems which confront those who are engaged in promoting the health of men engaged in industrial pursuits, none presents greater difficulty than the question of respirators. The inhalation of certain dusts induces a fibroid condition of the lungs, and this is believed to predispose the subject to tuberculosis, but although finely pulverized silica, such as comes from sandstone, is certainly a dangerous dust, we do not know why this is so, nor why other

dusts—such as, for example, plaster-of-Paris and hydraulic cement dusts—should apparently be innocuous. Investigations are at present in progress for the purpose of trying to ascertain whether it is the sharp angularity of the quartz which bestows on silica dust its deadly character, but our knowledge on this point up to the present time is very meagre.

"The principal means of combating the dangers of dust now in use are: (1) fans for removing it; (2) the use of water to prevent it from rising or to lay it after it has risen; and (3) respirators.

"At first sight it might seem that a man provided with an efficient respirator would be perfectly safe, even if surrounded by dust. This is true; but, unfortunately, if the respirators are efficient they not only keep out the dust, but also become so intolerably hot, and interfere so completely with respiration that it is impossible to wear them in practice. So far no one has yet designed a simple form of respirator that is at the same time efficient."

The author designed a respirator on the same principle as that used for diving dresses and firemen's helmets. The respirator is of conical form which enables it to be moulded to fit any face and is held in place by two straps passing over the head in such a way that the cone may easily be removed for expectorating, etc. An inlet pipe for air keeps up a steady stream of air which issues from the pointed nozzle and tends to blow dust away from the face. An interior cone serves to break the force of the entering air, and prevent it from impinging in a cold stream directly on the mouth and nose.

Recent Publications.

Among some of the bulletins and pamphlets which have come to our notice, the following may be of value to persons interested in general topics of industrial hygiene and safety:

The United States Department of Labor, Bureau of Statistics, has recently published under the head of Bulletin 142, the results of an investigation made of the methods of "Administration of Labor Laws and Factory Inspection in Certain European Countries." The investigation covered Great Britain,

Germany, France, Austria, Belgium, and Switzerland.

The conclusions drawn from the investigation are quoted in part below:

"Is there anything special in the theory or practice of factory inspection abroad, either in the form of organization, or in the specialization of functions, or in the standards set for safety and sanitation, or in the methods of inspection, that is new, specially distinctive, or much superior to the practices among the factory inspection departments in the United States? The author does not believe there is.

"In some of our best organized factory inspection departments in several states we find a form of organization and a functional specialization that is certainly not behind the best examples of European inspection departments. Indeed, some of our new industrial commissions have certain points of superiority over European practices. We also find factory inspection departments in some states that have of late years made a serious attempt to adopt scientific standards and have resorted to expert industrial advice, and to trade and industrial conferences, methods which are destined to equal, if not surpass, the practices and methods used in other countries.

"Wherein, then, is the superiority of European inspection over that of the United States, if there is such superiority?

"The author's opinion is that such superiority does exist, but it exists only in 'the higher grade and character of the inspectorial force.'

"In this respect Europe is far in advance of the United States. We have no such inspectors as a class. Here and there, in one state and another, there may be found one or more excellent examples of efficient trained factory inspectors; but these are isolated cases. The rank and file of European inspectors are far above the rank and file of our own inspectors.

"The reasons for this anomalous situation are found in the body of the report as well as in the introduction. They may be summed up as follows: (1) factory inspection in Europe is a profession, a vocation, and is regarded as a life work; (2) factory inspect-

ors in Europe must go through a long preliminary preparation, must have a scientific education and technical training; (3) merit, length of service, and competence are the only cases for promotion from one grade to another; (4) superiors, chiefs, and heads of the service are promoted from the ranks only for merit, experience, length of service, and competence; (5) the tenure of office is secure, promotion certain, treatment liberal, and a pension is given for long service and old age."

Another bulletin (152) issued by the same department is a Summary of Decisions of Courts and Opinions Affecting Labor in 1913.

"The material distributes itself naturally under two general heads: opinions of the attorney-general and court decisions, the latter being presented under the subdivisions, decisions under statute law, and decisions under common law. The question of the application of the recent eight-hour legislation by Congress affords the only subject for consideration by the attorney-general here noted. Among court decisions, workmen's compensation decisions are perhaps of first rank, both in numbers and interest. The Federal statute relative to the liability of railroad companies engaged in interstate traffic for injuries to their employees afforded the basis for much litigation, and a number of cases were carried to the circuit courts of appeals and to the Supreme Court. A point of particular interest involved in these cases is as to the boundaries to be set to the law in its inclusion or exclusion of certain classes of employees."

The New York State Department of Labor has recently issued their annual report for 1913. This is a very complete report of the different lines of work carried on by the department, including a report of the commis-

sioner, a report of the Bureau of Inspection, report of Bureau of Mediation and Arbitration, and Bureau of Industries and Immigration. There is also a summary of the state labor laws, the workmen's compensation law, 1913, and opinions of the attorney-general concerning labor laws.

The Industrial Board of the New York State Department of Labor, during the past summer, issued a pamphlet concerning the proposed rules defining fire-proof and fire-resisting materials and describing certain specifications relating to construction. Since these rules apply particularly to the construction of industrial buildings they may be instructive for those interested in this subject.

A bulletin recently issued by the Children's Bureau of the United States Department of Labor concerning laws relating to "Mother's Pensions" in the United States, Denmark, and New Zealand, is instructive in that it presents in concise form the latest ideas and laws on this subject. Miss Julia C. Lothrop, chief of the Bureau, says in part concerning the report:

"The methods and standards prescribed in the different states vary. It is impossible that all should prove equally valuable in serving their common purpose. At the present time it is impracticable for this bureau to undertake any field study of the operation of these laws (even were it not premature,) but in view of the immediate legislative importance of the matter of its various bearings it is believed that the compilation of American texts, together with the New Zealand law passed in 1911 and a translation of the Danish law passed in 1913, added for purposes of comparison, will prove timely and useful. The bibliography, while not exhaustive, contains most of the significant recent material."

CURRENT PUBLIC HEALTH LITERATURE.

AMERICAN.

American Journal of Medical Sciences.

CXLVIII, No. 2. August.

Smegma Bacillus. G. E. Brereton and K. W. Smith.

Archives of Pediatrics, New York.

XXXI, No. 8. August.

Etiology of Whooping Cough. A. W. Williams.
Clinical and Sociological Aspects of Whooping Cough. J. L. Morse.

Engineering Record, New York.

LXX, No. 8. August 22.

Water Discharge Measurement with Chemicals.
Pt. 1. B. F. Groat.
Economic Aspects of Intermittent Sand Filters.
"Clean Up Week" in Philadelphia.

IX. August 29.

Water Discharge Measurements with Chemicals.
Pt. 2. B. F. Groat.
Growth of Chicago Sanitary Bureau.

X. September 5.

Revamped Waterworks and New Purification Plant at Fort Smith, Arkansas.
Econimical Depth of Covered Reservoirs. F. H. Carter.
Water Purification Plant at Flint.

XI. September 12.

Report on Electrolytic Sewage Treatment at Elmhurst. P. M. Travis.
Sanitation in Labor Camps.

Journal—Lancet.

XXXIV. No. 14. July 15.

Relation of Sanitation to Death and Disease. H. W. Hill.

Journal of Outdoor Life, New York.

XI. No. 8. August.

Problem of Infection in Tuberculous Families. J. B. Hawes.

Journal of the American Medical Association, Chicago.

LXIII, No. 9. August 20.

Twelfth Annual Summary of Fourth of July Injuries.
Plumbing and Health. Editorial.

X. September 5.

Active Immunization in Diphtheria and Treatment by Toxin-Antitoxin. W. H. Park and A. Zingher.
The Use of Antitoxin in Diphtheria. S. S. Woody.

No. 11. September 12.

Focal Infection. F. Billings.
The Newer Bacteriology of Various Infections as Determined by Special Technic. E. C. Rosenow.
Experimental Researches in Methyl Alcohol Inhalation. H. H. Tyson and M. J. Schoenberg.
The Bacteriology of Typhus Fever. R. M. Wilder.

Military Surgeon, Chicago.

XXXV, No. 2. August.

Sanitary Service of Maneuver Camps. J. H. Ford.
Investigation Relative to Life Cycle, Breeding and Some Practical Means of Reducing the Multiplication of Flies in Camp. H. C. Michie.

Oklahoma State Medical Association Journal, Muskogee.

VII, No. 3. August.

Relationship of Nervous Diseases to Venereal Diseases. J. W. Duke.
State Health Problems. J. C. Maher.

Public Health Reports.

XXIX, No. 35. August 29.

Plague in New Orleans.

XXXVI. September 4.

Plague in the United States.
The Making of Health Officers—The Possibilities of State Departments of Health Improving the Efficiency of Local Health Officers by Means of Correspondence Courses in Health Administration and Allied Subjects.
Mosquitoes and Malaria—Report on a Short Trip in Eastern North Carolina.
Plague Eradicative Work.

XXXVII. September 11.

Plague Eradicative Work.
Certificates of Health before Marriage—Wisconsin Marriage Law Held Valid by a Divided Court.
The Hygiene of Rural Schools.

XXXVIII. September 18.

Plague Eradicative Work.
Trachoma—A Survey of Its Prevalence in the Mountain Sections of East Tennessee and Northern Georgia.
Tuberculosis—The Financial Aspect of the Sick Leaving Home in Search of a Beneficial Climate.

FOREIGN.

British Medical Journal, London.

2797. August 8.

The Responsibility of the State in Connection with Venereal Disease. A. K. Chalmers.

Public Measures against Venereal Disease in Denmark. E. Pontoppidan and L. McIlroy.

Essential Preventives of Prostitution. L. Grant.

Journal of State Medicine, London.

XXII. August 8.

Germ Carriers. L. Vaillard.
Rise and Progress of Factory Legislation. T. Oliver.

Monatschrift fur Kinderheilkunde, Leipzig.

XIII, No. 8. July.

Dissemination of Scarlet Fever by Fomites. R. Weigert.

AMERICAN JOURNAL OF PUBLIC HEALTH

SHELLFISH CONSERVATION AND SEWAGE DISPOSAL.

GEORGE A. JOHNSON.*

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

Something like two centuries ago a noted British satirist made the statement that the man who first ate an oyster possessed a considerable degree of courage. This remark of such delicious facetiousness lives even today. Inasmuch as the first reference to a possible connection between a typhoid fever outbreak and oysters dredged from polluted sources was made by Dr. Pasquier about one hundred years ago, it is probable that Swift's humorous arraignment of the succulent bivalve was inspired by its unsightly, flaccid appearance, and the fact that the first man to eat one probably, like the somewhat less famous Bosco, "Ate it alive."

Of the nutritious qualities of shellfish there can be no question. Of the palatability of raw oysters and clams we are equally certain, and of those who profess not to fancy them in this form the vast majority, in all human probability, dodge the issue for the reason that in their hearts they suspect the kindly nutrient intentions of the passive victim, or prefer it cooked.

The aborigines made free use of shellfish as food, and we know that the Pilgrim Fathers derived no little benefit from them in the same connection. But in those days, there were no huge sewer outfalls spewing their noisome burdens over the shellfish grounds, nor did the natives make a habit of gathering oysters and, before consumption, "fattening" them in polluted brackish or fresh water. They seem to have been content with the raw material, so to speak, not being particularly interested in the bulk or appearance of the oyster itself.

Today conditions are different. The shellfish industry has grown until the value of the total annual output of nearly 40,000,000 bushels amounts

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approximately to \$20,000,000, three fourths of which is controlled by New York, Virginia, Connecticut, Maryland, New Jersey, Rhode Island, Louisiana and Massachusetts. Sanitary conditions naturally have changed also. Where shellfish formerly grew in a naturally pure state there now often discharge huge sewer outfalls, polluted rivers, the effluents of sewage treatment works, and sewage in more or less concentrated form is carried directly or indirectly over the shellfish grounds by winds and currents. The oyster filters enormous quantities of water, and under such deplorable conditions it is but natural that in so obtaining its food supply much sewage matter is taken in and retained by it.

Is the oyster extravagantly maligned or is it an even worse menace to the public health than it is generally supposed to be? There can be no question that, growing in polluted waters, the oyster will take in and retain pathogenic germs, if such are present in the water. Although typhoid germs do not multiply within the body of a healthy oyster, but live there in steadily decreasing numbers, the evidence is pretty strong that in dead oysters this germ will actually flourish. Thus it is easily conceivable that one dead oyster may contaminate scores of perfectly good oysters growing in the same vicinity, or stored and transported in the same receptacle.

It is equally certain that polluted oysters can cause, and repeatedly have caused, epidemics of typhoid fever and other intestinal disorders. The proof is thus afforded that polluted oysters can produce disease in the human organism, but the far greater and more serious aspect of polluted oyster consumption refers to such isolated and sporadic cases of sickness as are traceable to no specific source but which plainly may have emanated from unclean oysters. There is no way even of estimating the number of deaths which annually may be caused in this way; but it may well be many times that disclosed by well-defined epidemics traced with certainty to polluted oysters.

How can the oyster be protected from dangerous pollution? This is no simple question. The writer speaks feelingly on this point for the reason that about a dozen years ago he experienced the first of three attacks of gastro-enteritis, of which the one mentioned was traced with positiveness to oysters dredged from one of the most famous oyster grounds in the world, and consumed in an establishment of international reputation for the excellence of its sea-food, shellfish in particular.

Over three hundred years ago we were advised to eschew the consumption of oysters in every month that has not an R in its name. Of recent years we hear much of the possibilities of "oyster hibernation." The theory is that during the cold months of the year the shell closes tightly, and the oyster passes into a "sleeping" state, only to open and resume its normal functions with the advent of warm weather. Hence oysters

dredged in the cold months supposedly are safer to eat than in the warm months. Naturally this feature is of much less significance in the warm waters of the South, but seems to be worthy of consideration in connection with oyster harvesting in the colder northern waters, the most serious difficulty being, however, that in some northern waters the shellfish grounds are frozen over at the time when the oyster may be hibernating, making harvesting at such times a virtual impossibility. Furthermore, obstructions preventing the complete closing of the shell, or the occasional casual opening of the shell, would tend to minimize the salutary effect of hibernation.

Polluted oysters cannot always be made entirely safe for consumption even by cooking, and still remain palatable. Heat, as ordinarily applied in cooking shellfish, does not destroy all the germs they may contain, for to do so would be to impart to them the consistency of rubber. It is a well-known fact that among connoisseurs the best oyster or clam stews are the so-called "one minute" variety wherein the shellfish are first brought to a simmer in a pan, the milk being then immediately added, and the whole brought to a first boil, when the stew is ready. The heat so applied does not reach all parts of the bivalve, but pleasantly warms it through.

Without placing an utterly unbalanced financial burden on the responsible communities, how may shellfish grounds be protected from contamination by the sewage of such communities? Shellfish are most profitably grown in localities where the intermingling of salt and fresh water is best suited to their taste, and where the food supply is suitable and ample. The best grounds are found in the mouths of rivers and bays near the ocean, and it is indeed unfortunate for the industry that such waters are usually subject to continuous, or at least intermittent, pollution by the sewage of cities and towns located directly on or tributary to such waters. An ideal oyster ground is Jamaica Bay near New York, from whence come over 25 per cent. of the total oyster crop of New York state, yet some 40,000,000 gallons of sewage enter this bay each day, and the volume of sewage is steadily increasing.

Until the dream of the idealist is realized, and all sewage is made innocuous before discharge, there seems to be little hope that shellfish, where usually cultivated, are not to be considered to be and still remain a potentially dangerous article of diet for human consumption unless perhaps, after being harvested, they are removed to an unpolluted water and there allowed a period for self-purging before being placed on the market. It seems to be reasonably certain that polluted shellfish, when placed in constantly changing, unpolluted water, will purge themselves of impurities in from one to two weeks. This department of oyster cultivation and harvesting has received altogether too little attention in the past.

This refinement in the preparation of shellfish for the market may not

be the ultimate answer to the problem, but it deserves exhaustive study. If the results of such studies prove favorable there should not be a sensible oysterman who would not gladly adopt it, for with the coöperation of a supervising federal or state authority he would then be enabled to furnish for the market certified shellfish, and the thinking consumer could never object, but rather should heartily approve of an increase in the selling price sufficient to cover the cost of such treatment, being assured of the purity of the food he is consuming.

Until prohibited by federal or state authorities, shellfish polluted and clean will continue to appear on the table, and even if forbidden for public sale they will still be used. Except in special, well adapted cases, it is impossible on financial and other grounds absolutely to conserve the purity of shellfish by sewage treatment. Complete treatment of the sewage entering waters which flow over shellfish layings will improve existing conditions, and in special cases almost, if indeed not entirely, remove the existing danger; but to be thoroughly effective a condition is required which is seldom if ever found at the sewage treatment works today. There would be required not only extreme conscientiousness in the operation of the sewage treatment works, paralleling the vigilance with which good water filtration works are watched, but also interstate coöperation, the whole order of affairs being supervised by a supreme authority vested by law with power to approve or condemn.

The conservation of the shellfish industry is a difficult problem, made so by the fact that common law rights of sewage disposal into the sea and its estuaries have been and are being extensively utilized. To set these conditions back a century solely for the sake of conserving the oyster industry, where no other offense is created, is a matter which, if pressed, will engage active sanitary, financial and legal minds for many years to come.

THE GERMICIDAL ACTION OF SUNLIGHT UPON BACTERIAL SPORES.

JOHN WEINZIRL,

Professor of Bacteriology, University of Washington.

Read before the Laboratory Section of the American Public Health Association, Colorado Springs,
September, 1913.

The germicidal action of sunlight upon bacteria has been extensively studied by a number of investigators. A review of these investigations was given by the writer in an earlier paper (Weinzirl, *Jour. of Inf. Dis. Sup. No. 3*, p. 128, 1907). In this paper it was shown that when bacteria are freely exposed without the intervention of culture media, direct sunlight kills most vegetative forms in the remarkably short time of two to ten minutes. While the facts concerning the vegetative forms have been worked out pretty thoroughly, the same cannot be said regarding spore forms. Among the earlier workers in this field Arloing first, and Ward later, worked with anthrax spores, exposing them in gelatin and agar plate cultures. Arloing (*Comp. rend.* 1885) found that twenty-five to thirty hours were required to kill the bacilli in plate cultures, but if spores were exposed in test tubes filled with bouillon, he obtained the curious result that they were killed in two hours. If the spores in bouillon were kept on ice to prevent germination, it required the longer period to kill them. Thus he was led to the anomalous conclusion that spores are killed more readily than vegetative forms. Ward (*Proc. Roy. Soc.* 1890-4) also experimented with anthrax and at times used spores only. He found that in March one-half to one hour exposure to sunlight caused inhibition of growth, and one to one and one-half hours' exposure showed the bacteria partly killed out. He found it impossible to determine the exact time required to kill because of the varying intensity of the light at different times. Apparently it required several days to completely kill his cultures. He too found that spores were more easily killed than vegetative forms, and offered the explanation that this might be due to the greater amount of fat contained in the spores. When spores were sealed in a vacuum, they were not killed as quickly as in air. So far as the writer is aware, no other investigations have been published relative to this problem.

In view of the fact that the above results are diametrically opposed to what would be expected, judging from the well-known resistance of spores to all other destructive agents, and also because the technique employed was not the best adapted to the purpose, it seemed desirable to re-open the question and work by means of the direct exposure method devised

by the writer. To restate the method briefly, bacteria or spores are brought into a uniform suspension in physiological salt solution; by means of a platinum loop a droplet of this suspension is placed upon sterile paper or glass; the film is then exposed to sunlight in sterile petri plates with the covers on or removed as conditions may determine. The advantage of this technique is obvious for the purpose in hand. First, the full effect of the sunlight is secured, there being no medium intervening to absorb the light rays, especially the chemical rays. Secondly, the germicidal substances such as hydrogen peroxide, ozone, formaldehyde, phenols, organic peroxides, etc., formed from the medium under the influence of the chemically active rays, are not produced, and hence their action, always present in the earlier experiments, can be eliminated, thus giving the effect of sunlight alone. Thirdly, a special advantage exists in the case of testing out spores. If spores are exposed in a culture medium they absorb moisture and may even germinate before the end of the experiment. Undoubtedly the naked protoplasm of the germinating spore would be more vulnerable than either spores or mature vegetative forms having a protective cell wall.

TIME REQUIRED BY SUNLIGHT TO KILL SPORES.

The attempt was made first of all, to determine the time required by direct sunlight to kill spores. For this purpose cultures approximately one month old were used. Emulsions approximating a 24-hour-old bouillon culture of typhoid were made in salt solution, then heated at 80° C. for 10 minutes, cooled, and spread upon the sterile paper slips in petri dishes. When the water had evaporated, the plates containing the slips were exposed to direct sunlight as nearly vertically as practicable. These paper slips, after insolation, were placed either in petri dishes and covered with agar, or in bouillon tubes, and after incubation, examined for growth. In this manner the following results were secured.

TABLE 1.—SHOWING THE TIME REQUIRED FOR DIRECT SUNLIGHT TO KILL BACTERIAL SPORES.

Organism.	Date.	Time exposed (hours):	
		Growth.	No growth.
<i>Bact. anthracis</i>	Dec. 26	0.5, 1, 2, 3	.....
	" 30	3, 4.5, 6.5	8.5
	April 1	0.5, 1	.....
	" 2	0.6, 1.3	3, 6
	" 3	0.3, 0.6, 2, 3	4
	" 7	1, 1.5, 2	2.5, 3, 3.5
	May 17	0.5, 1, 1.5	2.5
	" 19	0.5, 1, 1.5, 2, 2.5	.....
	" 28	1, 1.5, 2, 4	.....

TABLE I.—(Continued).

Organism.	Date.		Time exposed (hours).	
			Growth.	No growth.
<i>B. megatherium</i>	Dec.	26	0.5, 1, 2, 3	.....
	"	30	3, 4.5, 6.5	8.5
	July	29	4	2, 6
			2	4, 6
			2	4, 6
			2	4, 6
			2, 4	6
	"	31	2	4, 6
			2, 4	6
			2, 4	6
			2, 4	6
			2, 4	6
<i>Bact. mycoides</i>	"	1	2	6.5
	"	5	1, 2	5
	"	5	1, 2	5
	"	5	1, 2, 5	0
	"	29	Control	2, 4, 6
			"	2, 4, 6
			"	2, 4, 6
			"	2, 4, 6
			"	2, 4, 6
	Aug.	1	1	3, 5
			1	3, 5
			1	3, 5
<i>B. subtilis</i>	Dec.	26	0.5, 1, 2, 3	.....
	"	30	3, 4.5, 6.5, 8.5	.....
	July	1	2	6.5
	"	5	1, 2, 5	.....
			1, 2	5
			1, 2, 5	.....
	"	7	1, 2, 5	.....
			1, 2, 5	.....
			2	5
	"	8	2	5
			2	5
			2	5
<i>B. vulgatus</i>	"	8	2	5
			2	5
			2	5
		31	2	4, 6
			2	4, 6
			2	4, 6
			2	4, 6
			2	4, 6

As the table shows, five different species of spore formers were tested

out, viz., *Bact. anthracis*, *B. megatherium*, *Bact. mycoides*, *B. subtilis*, and *B. vulgatus*. In only a few instances were all the spores killed within 2 hours; usually a longer time was required, the longest being 8.5 hours. A rough average would then give 5 hours as the approximate time required to kill bacterial spores.

If we now examine the time required by the various species investigated, no very marked difference appears; *Bact. mycoides* is apparently the least resistant, while *B. megatherium* seems to possess the greatest resistance.

RELATIVE RESISTANCE OF SPORES AND VEGETATIVE BACTERIA.

If we now compare the results for spores with those obtained for non-spore forming bacteria (Weinzirl, loc. cit.) then it is perfectly plain that the spores have the greater resistance just as we should expect; the non-spore formers are killed commonly in 2 to 10 minutes, while the spores require 2 to 8 hours. However, some micrococci, especially soil and air forms, show an unusual resistance to sunlight, requiring in one instance more than 1.5 hours to kill. Hence it might be possible for the vegetative stage of spore formers to also show an unusually high resistance and possibly, too, as Ward and Arloing found, that they are even more resistant than their spores.

In attempting to solve this problem, ideal conditions would be met if we could compare pure spores, and pure vegetative cultures. A pure spore culture was obtained by heating the suspensions at 80° C. for 10 minutes. To obtain pure vegetative forms was not so easily accomplished. *Bact. anthracis*, Pasteur found, does not procure spores under anaërobic conditions; accordingly this organism was grown under an atmosphere of hydrogen, but a spore-free culture could not be obtained after repeated trials; when exposed they gave the same results as spores; when microscopically examined, occasional spores were seen; and when heated to 65° C. for 80 minutes, sub-cultures gave growth. Hence, this plan failed of its purpose. The attempt to gain a spore-free culture by growing anthrax at 43° to 45° C., according to Pasteur's method, also failed. Even if sporeless cultures could have been obtained by this method, their vitality was so impaired as to make them uncomparable to vigorous forms. The next move was to grow sporeless cultures by making transfers several times a day and then using a very young culture; when heated to 80° C. for one hour, the subculture grew, showing that spores were still present.

In the earlier work when anthrax was grown in an atmosphere of hydrogen, the cultures were left at room temperature. It seemed wise to try blood heat also. Accordingly the cultures were placed at 37° C., and this proved more successful. Three experiments were made on this basis, giving the following results:

From the trials made, it would appear that the bacilli or vegetative forms are less resistant than the spores. Since the direct method could not

TABLE II.—GIVING COMPARATIVE RESULTS FOR ANTHRAX SPORES AND FOR VEGETATIVE ANTHRAX WHEN EXPOSED TO SUNLIGHT.

Date.	Culture.	Time exposed (hours):	
		Growth.	No growth.
May 17.....	Anthrax spores	0.2, 0.5, 1, 1.5, 2.5	.....
“ 19.....	“ bacilli	0.2, 0.5, 1	1.5, 2.5
“ 19.....	“ spores	0.5, 1, 1.5, 2.5	.....
“ 19.....	“ bacilli	0.5, 1	1.5, 2, 2.5
“ 28.....	“ spores	1, 1.5, 2, 4	.....
	“ bacilli	1, 1.5	2, 4

be applied to other spore formers, it had to be abandoned for the indirect; that is, if it can be shown that spore cultures are not less resistant than mixed cultures, then it is a fair inference that vegetative forms are not only not more resistant, but probably less resistant.

The results of the indirect method cannot be entirely satisfactory for obvious reasons. The heating of the spores might make them less resistant than the unheated cultures; again, a clump of bacterial threads may serve to protect spores underneath and thus introduce irregularities; and if the same culture is used for both trials, then the vegetative forms may be weakened by age. From the results given there does not appear to be any marked tendency of increased resistance for the vegetative forms, and therefore, we may infer that the vegetative forms are not more resistant.

TABLE III.—GIVING TIME REQUIRED BY SUNLIGHT TO KILL SPORES (HEATED) AND SPORES AND VEGETATIVE FORMS.

Organism.	Condition.	Date.	Time exposed (hours):	
			Growth.	No growth.
<i>B. megatherium</i>	spores only	July 31	2	4, 6
	“		2, 4	6
	“		2, 4	6
	“		2, 4	6
	“		.....	2, 4, 6
	spores and bacilli	“	.....	2, 4, 6
	“ “		.....	2, 4, 6
	“ “		2	4, 6
	“ “		.....	2, 4, 6
	“ “		2	4, 6

TABLE III.—(Continued).

Organism.	Condition.	Date.	Time exposed (hours):	
			Growth.	No growth.
<i>Bact. mycoides</i>	spores only	Aug. 1	1	3, 5
	“		1	3, 5
	“		1	3, 5
	spores and bacilli		1	3, 5
	“ “		1	3, 5
	“ “		1	3, 5
<i>B. vulgatus</i>	spores only	Aug. 22	1, 3	5
	“		1, 3	5
	“		1, 3, 5	.....
	“		1, 3	5
	spores and bacilli	“	1, 3, 5	.....
	“ “		1, 3, 5	.....
	“ “		1, 3, 5	.....
	“ “		1, 3, 5	.....
<i>E. subtilis</i>	spores only	“	1, 3, 5	.....
	“		1, 3, 5	.....
	“		1, 3, 5	.....
	“		1, 3, 5	.....
	spores and bacilli	“	1, 5	3
	“ “		1	3, 5
	“ “		1	3, 5
	“ “		1, 5	3

SUMMARY.

It seems likely, then, that the earlier workers using a medium in which to expose the spores, probably failed to prevent their germination, and in this way failed to get the true resistance of spores. By planting them on paper and exposing them directly, this complication is avoided, the true resistance is shown, and this corresponds to their well-known superior resistance to other killing agents. The time required to kill bacterial spores varies from 2 to 8 hours, or about 60 times that required to kill non-spore forming bacteria.

THE DESTRUCTION OF BACTERIA THROUGH THE ACTION OF LIGHT.

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It is generally assumed that artificial light is more harmful to the eyes than daylight. This has been ascribed by many to the quality of the artificial light rather than to the faulty distributions and intensities which seem quite as likely to be the causes of the observed effects. That this harmfulness may be due to ultra-violet radiation in the light seems, at first sight, plausible, particularly in view of the known facts concerning the bactericidal action of these radiations. As the opening step in a series of investigations on the true cause of the difference in the physiological action of natural and artificial illumination, it seemed desirable to determine definitely the wave-lengths which accomplish the destruction of bacteria. Previous investigators generally have made use of full sources of light, for example, the carbon arc, iron arc or mercury arc, without any analysis of the radiation. The use of a quartz spectroscope and accessories naturally suggests itself as a means of getting more exact information.

The objects of this work may be specifically stated as follows: To determine precisely the wave-lengths most destructive of bacteria; to find out whether or not simultaneous irradiation with rays of greater penetration is essential to the bactericidal action; and to investigate the effect of dissolved food materials, or other material, on the resistance of bacteria.

A large amount of work has been done on the destructive effects of light beginning with Downes and Blunt (77) and including DuClaux (85), Roux (87), Arloing (85), Buchner (92), Marshall Ward (93), Ledoux Lebard (93), Richardson (93), Dieudonne (94), Finsen and his pupils (99-07), Jodlbauer and his pupils (05-09), and Cernovdianu and Henri (10). It is not necessary to give abstracts of all of the papers above referred to. To sum up the entire series, the conclusion finally reached is that light containing radiations of a length less than 2,800 Angstrom units will, after a sufficient time, kill bacteria. No investigator whose works I have been able to locate has analyzed the radiation used with any kind of spectrometer and in only one case (Henri) have filtering screens been used. The work of the Finsen school is particularly interesting because of its application to the treatment of cutaneous bacterial diseases as lupus vulgaris and lupus erythematosus (due to the tubercle bacillus). The light used for this purpose is the so-called Finsen Ray (Violet Ray, or Actinic Ray). To pro-

duce curative effects, the entire radiation of a carbon arc must be used, the ultra-violet alone being ineffective, according to Finsen. Further, the light must be concentrated by condensing lenses. In these lamps, the light-path includes a system of quartz lenses and, in addition, ten or twelve inches of distilled water which must absorb all of the far ultra-violet and infra-red. The bactericidal effect must therefore be ascribed to the intermediate waves. The exposures made are for a minimum of seventy minutes. There can be no question of the fact that cases of lupus have been cured by the repeated use of this light.

Within the last three years the Cooper-Hewitt Company, under the direction of Doctors Henri, Hebrunner and Recklinhausen, have produced a water sterilizer making use of a quartz mercury arc—a source particularly rich in ultra-violet rays. The published advertisements claim that with an expenditure of $\frac{3}{4}$ of a kilowatt, 5,000 gallons per hour can be sterilized completely. These sterilizers are in use on a large scale in the city water works of Luneville (France). In this apparatus the water flows over a partition in a thin sheet at a distance of a few centimeters from a quartz lamp of the same type as one used in this investigation. The effects are ascribed to the ultra-violet rays in the light. No screens of any kind are used.

Any study of the destruction of bacteria must consider the following factors:

- (1) Character of the medium containing the organisms at the beginning of the test, whether solid or liquid, nutrient or non-nutrient, absorbing or non-absorbent, oxygenous, or not—also the changes which may be produced in the medium due to the action of the light.

- (2) The presence or absence of protective layers due to the medium or to superficial layers of bacteria.

- (3) The character of the radiation (a) wave length, (b) intensity, (c) heat content.

- (4) Time of radiation.

In this investigation these factors were taken care of severally as follows: (1) As a solid medium agar-agar was used; as liquid media both normal salt solution (non-nutrient) and water containing dissolved food materials. No investigation of the effect of the radiation on the medium was made. Agar is highly absorbent and the only effect to be anticipated in the water is through the production of hydrogen peroxide and the amount of this has been determined by other investigators to be negligible. (2) On agar the presence of a protective layer of the medium was avoided by using surface colony bacteria only. The probability of the occurrence of superficial growths serving to protect more deeply buried bacteria was minimized by exposing the plates immediately after inoculation. (3) The character of the radiation was altered in intensity by using various current

strengths with an iron arc and by using a mercury arc on parallel tests. For each source different distances were used. The radiation was analyzed with a two-prism quartz spectroscopy and the wave-lengths exactly determined by comparison with known lines in the mercury arc spectrum. Glass screens of different thicknesses were employed when the work was done at short distances. The direct heating effects were avoided, where necessary, by water cooling the exposed plates. (4) Various times of exposure were made ranging from ten seconds to three hours according to circumstances.

As stated above two sources of radiation were used—the iron arc and the quartz mercury arc. The iron arc was a right-angled hand lamp with half-inch wrought iron electrodes turned to points—the positive pole at 30 degrees, the negative at 15 degrees. The lamp was run on a 110-volt direct current circuit under various current strengths ranging from three to twenty. The current strengths were adjusted by means of a series rheostat. The mercury lamp was a quartz Cooper-Hewitt arc and was operated on the same circuit, *i. e.*, 110-volt direct.

The lamps were supported before an adjustable slit which was kept 2.5 cm. by .05 cm. at all times. The light was collimated by a quartz lens 3.8 cm. in diameter and 25 cm. in focal length and passed through a system of two 60-degree quartz prisms 5 cm. in altitude (cut with their axes perpendicular to their bases). The dispersed light was focused by a second quartz lens similar to the collimating lens and gave a spectrum between (from the visible end of the red to the limit of the ultra-violet) 12.7 cm. and 15 cm. in length. This spectrum could be focused very sharply on a screen and, though curved and somewhat distorted because of the aberration of the lenses, gave excellent definition of closely adjacent lines. The spectral band was, of course, sharply curved in a horizontal plane due to the shorter focus for the ultra-violet radiations. A sheet of uranium glass was supported in an adjustable holder and used to explore and focus the ultra-violet. The ultra-violet lines showed up sharply and distinctly on this plate and could be located accurately. Similarly supported on a stand was a small (13 mm.) total reflection prism of quartz which, when placed in the converging light, served to reflect it downward to a focus on a small, adjustable, horizontal table on which the cultures were placed for exposure. The entire apparatus, with the exception of the lamp, was enclosed in a light-proof case provided with a head-cloth to make inspection and adjustment possible during runs.

After the apparatus was rigidly adjusted to minimum deviation of the sodium line, the spectrum of the mercury arc was explored with the uranium glass and compared with a photograph of the arc spectrum made in the Cooper-Hewitt laboratories. This photograph was marked in wave-lengths. All of the lines in the photograph were located and, in addition, 4 lines in the neighborhood of 1900–2000 not visible on the photograph.

The positions and wave-lengths of all of the lines were accurately noted on the top of the horizontal table as they were thrown down in succession by moving the reflecting prism. The iron arc spectrum was next calibrated by direct comparison with the mercury spectrum. The reflecting prism was placed, as is usual in such comparisons, so that it covered half of the slit and both spectra were thus thrown edge to edge on the uranium screen. In this way the wave lengths of eight lines in the ultra-violet of

TABLE NO. 1.

Material.	Thickness.	Limits.
Glass—		
plate—greenish	3.15 mm.	Cuts clean to 334—dims 334.
plate—greenish	2.0 mm.	Cuts clean to 334—
plate white	1.96 mm.	Dims 291, 303 and 313 a little.
	3.99 mm.	Dims 313 a little, shows 302 very faint.
cover glass	.15 mm.	Dims 302 and 291, no effect on 313.
cover glass	.12 mm.	Extinguishes all beyond 253.
		Cuts 265 and 253 to about $\frac{1}{5}$. Dims 291.
watch crystal	1.85 mm.	Nearly extinguishes 291.
		Dims 303 and 313.
Quartz—		
plates	3.0 cm.	No effect.
Distilled water		
in glass cells	1 cm.	No effect.
quartz ends	15 cm.	No effect.
Celluloid—		
transparent		
yellowish	1.63 mm.	Cuts to 334. 334 very dim. 365 dim.
Agar-agar—		
solid plate on quartz	1.5 mm.	Cuts sharp to 290—no effect above.
Grease—(beeswax)	.9 mm.	Cuts 236—dims 253 and 313 a little.
films on quartz		Transmits 275.
on glass (thin white)		Transmits 313.

the iron arc were accurately determined and others were subsequently located by comparison with the excellent chart of the iron spectrum prepared by Buisson and Fabry.

At this stage the extent and intensity of the ultra-violet portions of the mercury and iron arcs were compared directly and it was unmistakable that, at ampereages above twelve, the iron arc gave shorter ultra-violet radiations (running down to 1850, the limit set by the absorption of the quartz) than does the 110-volt mercury arc and, in spite of the closely set

lines nearly uniformly distributed, an intensity at all points comparable with that of the isolated lines of the mercury arc. The iron arc ought, therefore, to be, excepting for its unsteadiness, better suited to work in the ultra-violet than is the quartz mercury lamp. As might be expected, the intensity of the ultra-violet radiations from the iron arc increases with the ampereage used. The relative intensities were in all cases judged by the energy of fluorescence on the uranium glass.

The transmission limits of certain thicknesses of glass, of layers of water and of other substances were measured in order that plates of these materials might be used as screens to cut off the shorter wave lengths when this was desirable. The transmission was determined by the use of the uranium glass and the mercury arc. The results of the tests are shown in Table No. 1.

The purpose was to start with certain typical bacteria both pathogenic and non-pathogenic forms. The ones selected were *B. prodigeosus*, *B. pseudomonas pyocyaneus*, *B. coli communis*, and *B. typhosus*. In most of the work following cultures were made of these types in nutrient and non-nutrient water and exposed in definite wave-lengths of radiation for a certain known period. The exposed emulsions were then sown into agar plates in Petri dishes and incubated, with control cultures, for 24 hours at 37.5 degrees centigrade. Examination with a hand lens over a counting plate made possible the determination of the effect of the radiation. Some determinations of the effects of the radiations on motility were made using hanging drop preparations of the liquid cultures and (as noted subsequently) a number of series were run through with surface colonies made by direct inoculation of agar plates with a platinum needle.

In order to check the work of others done with the full radiation of the sources, the lamps were set up with proper diaphragms and supports and experiments run through as noted in Table No. 2.

These plates were incubated for 24 hours and the presence of the living bacteria demonstrated by the development of the green pigment. The tests, as actually made, were in the reverse order of the numbers here given. The conclusion is unavoidable—that *pyocyaneus*, when in surface colonies on agar, is not killed by the full radiation of the mercury lamp even at very short distances and long times. The glass screen used on cultures 1 and 13 cut off all radiation shorter than 365 units. (See Table No. 3.)

In making these tests the arcs were turned vertically and the emulsions exposed in quartz-bottomed cells. An electric fan placed on a level with the cell, at one side, was an essential part of this arrangement. The fan kept the cell cool and, in the use of the iron arc, prevented the condensation of the smoke of the arc on the quartz plate. One cubic centimeter from each sample was sown into the agar plates and, where any growth developed, the colonies were counted. The controls developed above 50,000 bacteria per cc.

TABLE NO. 2.

B. *PSEUDOMONAS PYOCYANEUS*—FRESH SURFACE CULTURES ON AGAR.

FULL RADIATION OF THE MERCURY ARC.

No.	Distance.	Time.	Results.	Remarks.
1	5 cm.	1 hr.	+	Under glass—water-cooled
2	5 cm.	1 hr.	+	Under quartz—water-cooled
3	8 cm.	1 min.	0	Under quartz—plate very hot
4	8 cm.	1 min.	+	Under quartz
5	8 cm.	15 min.	+	Under quartz—water-cooled
6	10 cm.	1 min.	+	Under quartz
7	10 cm.	1 min.	+	
8	22 cm.	1 min.	+	Under quartz
9	22 cm.	5 min.	+	Under quartz
10	22 cm.	5 min.	+	Under quartz
11	22 cm.	5 min.	+	Under quartz
12	22 cm.	5 min.	+	Under quartz
13	22 cm.	7 min.	+	Under glass
14	22 cm.	7 min.	+	Under quartz
Controls				

+ = normal growth. 0 = no growth.

TABLE NO. 3.

PYOCYANEUS IN WATER. FULL RADIATION.

A.—Mercury lamp.

No.	Distance.	Time.	Results.	Remarks.
1	8 cm.	1 min.	0	3 cc. of emulsion
2	8 cm.	1 min.	0	1 cc. of emulsion
3	Control		+	

B.—Iron arc. 12 amperes.

1	8 cm.	30 min.	0	3 cc. emulsion
2	8 cm.	20 min.	0	3 cc. emulsion
3	Control		+	
4	8 cm.	1 min.	0	3 cc. emulsion

These results show that pyocyaneus, when in emulsion in water, is killed with ease and certainty by very short exposures—on agar it is not at all affected. This is remarkable.

The following tests were made with *B. typhosus*.

TABLE NO. 4.

AGAR PLATES INOCULATED WITH TYPHOSUS AND EXPOSED TO THE FULL RADIATION OF THE MERCURY LAMP.

No.	Distance.	Time.	Results.	Remarks.
1	5 cm.	1 min.	+	Under glass—3.15 mm.
2	5 cm.	1 min.	Inhibited	Under quartz
3	10 cm.	1 min.	Inhibited	
4	10 cm.	5 min.	Inhibited	
5	10 cm.	10 min.	0	Water-cooled under quartz
6	10 cm.	10 min.	+	Water-cooled under glass 3.15 mm.
7	Control		+	
8	Control	10 min.	+	Water-cooled under glass .13 mm.

The greater susceptibility of this bacterium (as compared with pyocyaneus) is here evident. The growth is seriously interfered with even for exposures so short as one minute and, in spite of the heavy inoculation with bacterial scum, none survive after 10 minutes at 10 cm. It is to be observed that the destructive effects are completely eliminated by a screen of glass .13 mm. thick which cuts out radiations shorter than 250 and impedes all shorter than 313. Unless care be taken in work of this kind destruction of the bacteria is likely to result from overheating—a temperature of 60 degrees centigrade being fatal. As above noted, the exposed plates were water-cooled and thermometers were supported over them to make certain that the temperature never rose above 40 degrees.

An emulsion was now made of typhosus in normal salt solution. Portions of this emulsion were treated in glass cells under quartz covers to the full radiation of the mercury lamp and were then sown into agar plates and incubated. The results are tabulated below. The numbers given show the bacteria alive per cc. after exposure.

Analysis of this set of results justifies the conclusion that at a distance of 5 cm. exposures of longer than 30 seconds will kill all of the typhoid bacteria in emulsion in water if the layer does not exceed .5 cm. in depth. It is to be observed that in deeper layers the action is less effective and that

TABLE NO. 5.

TYPHOSUS IN NORMAL SALT SOLUTION—FULL RADIATION OF MERCURY ARC.

Nos.	Distance.	Time.	Depth—			Under Glass
			5 mm.	1 cm.	1 mm.	5 mm.
1-2-3	5 cm.	5 sec.	23	2500		500
4-5-6	5 cm.	10 sec.	15	90		250
7-8-9	5 cm.	30 sec.	0	22		720
10-11-12	10 cm.	30 sec.	21	20	210	
13-14-15	10 cm.	1 min.	2	28	2	
16-17-18	10 cm.	3 min.	12	4	contaminated	

4 controls—21 cc.—too many to count.
2.1 cc.—30,000 and 27,000 per cc.

through glass (watch crystal transmitting nothing below 290) the development of this particular bacterium is inhibited. This last result is not consistent with other tests. The water worked with contained about 30,000 bacteria per cc. which is a number considerably higher than would ordinarily occur in contaminated drinking water. If the results in the last tabulation are expressed in percents they seem more striking.

Bacillus coli communis was subjected to the following tests under full radiation (mercury arc).

TABLE NO. 6.

- No. 1. Freshly inoculated agar plate 12 cm. from the lamp for 15 min. (under quartz).
Growth—normal.
- No. 2. Emulsion in distilled water—3 mm. deep—exposed at 12 cm. for 8 min. Agar plate inoculated from the emulsion by use of a platinum needle.
No growth.
- No. 3. Like No. 2—for 1 min.
No growth.

The single surface colony determination (1) can hardly be depended on as it stands alone. Here, however, as elsewhere the bactericidal action of the radiation is seen to be much more rapid and effective on bacteria in water than on surface colonies in any type.

Emulsions were now made of coli in distilled water, in normal salt solution and in ordinary tap water and were exposed in glass cells under quartz to the full radiation of the mercury arc. One cc. from each sample was sown into agar and incubated as in the earlier work. The results follow:

TABLE NO. 7.

No.	Distance.	Time.	Depth.	Result.	Remarks.
	5 cm.	1 min.	5 mm.	0	In distilled water
2	5 cm.	1 min.	2 mm.	0	In salt water
3	5 cm.	1 min.	5 mm.	0	In tap water
4	5 cm.	5 min.	5 mm.	0	In distilled water
5	10 cm.	1 min.	5 mm.	3 cc.	In distilled water
6	10 cm.	1½ min.	5 mm.	+	In salt water
7	10 cm.	5 min.	5 mm.	1/cc.	In distilled water
8	10 cm.	5 min.	5 mm.	0	In salt water
9	10 cm.	5 min.	5 mm.	0	In tap water
10	10 cm.	5 min.	2½ mm.		Lost
11	10 cm.	15 min.	5 mm.	0	In distilled water

Two controls—1200/cc.—normal.

It is evident from this tabulation that *coli communis* is very sensitive to the action of this light. Exposures of one minute at five centimeters destroy them completely. The action is unaffected by the small quantities of dissolved and suspended matter in the tap water.

A series of parallel tests were run with this organism using the iron arc. The emulsions were placed in quartz bottomed brass cells which, from their construction, were very hard to sterilize so that several of the emulsions were contaminated as noted. (See Table No. 8.)

The comparisons of the mercury and iron spectra referred to earlier in this paper indicated that the iron arc should be at least as effective as the mercury arc in treating bacteria. The results in this last table together with those previously stated for pyocyanus, show that they are, in fact, of the same order of effectiveness.

The conclusion of this work up to this point is that bacteria of the *coli* type (including typhosus) are, when in emulsion in water, readily killed by short exposures to lights containing amongst others radiations shorter than 2,500 units in length. Pyogenic bacteria—at any rate pyocyanus—are somewhat more resistant. This is practically the same conclusion as that reached by Henri. We will now pass on to a study of the effect on these bacteria of isolated ultra-violet waves.

The reflecting prism of the quartz spectroscope described early in this paper was adjusted to throw down a certain line of the mercury arc or a certain narrow group of lines of the iron spectrum. In this way an illuminated area, 2 cm. by 2 or 3 mm., was obtained on a certain mark on the horizontal table. The colony or emulsion was placed over this mark and properly screened from stray light by means of a slotted diaphragm.

TABLE NO. 8.

COLI IN EMULSION—FULL RADIATION OF THE IRON ARC.

No.	Distance.	Time.	Depth.	Result.	Remarks.
1	8 cm.	1 min.	4 mm.	contaminated	
2	8 cm.	5 min.	4 mm.	1/cc.	
3	8 cm.	15 min.	4 mm.	contaminated	
4	8 cm.	30 min.	4 mm.	1/cc.	
5	8 cm.	5 min.	2 mm.	0	
6	8 cm.	1 min.	2 mm.	0	
7	25 cm.	10 min.	4 mm.	contaminated	

Two controls—normal—about 30,000 per cc.

The first experiments were made with surface colonies of pyocyanus on agar-agar. A pencil mark, 1 cm. or 1.5 cm. in length, was made on the bottom of the dish near the center. The plate was then inoculated from a culture tube by drawing a platinum needle along the mark. It had been found (see Table 2) that the full radiation at short distance and long time had no effect whatever on pyocyanus on agar so that it is not surprising to find the analyzed radiation equally ineffective. Table 9 is a condensed report of the experiments.

Similar experiments on pyocyanus on agar, using the mercury arc, gave the results shown in Table 10.

In using these isolated lines a distance was taken such that the radiation certainly completely covered the area of inoculation. These tables show that isolated ultra-violet radiation of the intensity here used, as short as 240 μ , will not kill pyocyanus in surface colonies on agar. It must be remembered, however, that the full radiation did not affect surface colonies of this organism. (See Table 2.) The same organism in emulsion in water was readily killed by full radiation. (See Table 3.) Because of the suspicion that some of the bacteria were protected by a film of agar (the high absorbing power of which has been stated), no further experiments were made using this method.

A glass plate was cut and a slot ground in it with an opening 2 mm. by 10 mm. and 5 mm. deep. This plate was sterilized by boiling in distilled water for 40 minutes, the slot filled with an emulsion of the bacteria by means of a sterile bulb pipette, the slot then covered with a thin, sterile quartz cover and exposed on the horizontal table as before. The emulsion was then sown into agar plates and incubated. In this way the effect of the ultra-violet radiation of a limited range of wave-lengths (2 μ approxi-

TABLE NO. 9.

PYOCYANEUS ON AGAR—DISPERSED RADIATION OF THE IRON ARC.

Region	1	2	3	4	5	6	
Wave length	400	370	320	280	260	240	in $\mu\mu$

No.	Region.	Time.	Results.	Remarks.
1	1	15 min.	+	Lighter green than controls.
2	2	15 min.	+	Lighter green than controls.
3	3	15 min.	+	Lighter green than controls.
4	4	15 min.	+	Lighter green than controls.
5	5	15 min.	+	Lighter green than controls.
6	6	15 min.	+	Lighter green than controls.
7	1	30 min.	+	
8	2	30 min.	+	
9	3	20 min.	+	
10	4	15 min.	+	
11	5	15 min.	+	
12	6	10 min.	+	
13	6	16 min.	+	
14	6	30 min.	+	
15	6	20 min.	+	
16	5	20 min.	+	
17	5	60 min.	+	Pale.
18	4	15 min.	+	
19	4	30 min.	+	
20	4	45 min.	+	
21	3	2 hr. 23 min.	+	

Controls—all normal.

mately) was determined with all other radiation excluded. It is to be noted that, in spite of the slight apparent intensity of the radiation here used compared to the full radiation of the source, we have, nevertheless, practically all of the radiation of that particular wave-length contained in the full radiation (or such of it as gets through the collimator slit)—for quartz and air in layers of the thickness here used are said to absorb waves of lengths above 200 $\mu\mu$ very little. Further, the volumes of the emulsion and the shape of the container were here so altered, in proportion to the solid angle subtended, that the total flux through the slit gave approximately the same total radiation per cubic millimeter of emulsion as was applied in the use of the full radiation. On account of the collimation and

TABLE NO. 10.

PYOCYANEUS ON AGAR—DISPERSED RADIATION OF MERCURY ARC.

No.	Line.	Time.	Results.	Remarks.
1	313 $\mu\mu$	10 min.	+	
2	313	10 min.	+	
3	295	10 min.	+	
4	253	5 min.	+	Less green.
5	253	10 min.	+	
6	253	15 min.	+	Less green.
7	253	20 min.	+	
8	253	30 min.	+	
9	236	5 min.	+	
10	236	10 min.	+	
11	236	15 min.	+	

Controls—all normal.

focusing of the beam there was no decrease in the intensity due to the inverse square law and the conditions, as far as these lengths of ultra-violet radiation were concerned, were practically the same as if the emulsions were in the full radiation of the source at a distance of 25 centimeters, that is, the distance from the source to the collimating lens. The difference between the full radiation at the shorter distance and the dispersed radiation at the longer is threefold. In the first place, the full radiation may contain certain very short waves (under 185 $\mu\mu$) which are absorbed by air and by thin quartz. Shuman found, however, that one millimeter of air absorbed completely all radiations under 170 $\mu\mu$ so that these waves are obviously an unimportant factor. In the second place, the ultra-violet in the full radiation is associated with longer waves of greater penetration which may render the organisms more susceptible. In the third place the intensity of the ultra-violet in the dispersed radiation is diminished through reflection from the prism faces and through absorption in the quartz prisms and lenses. The effects of these differences will be studied in full later. The results of the experiments made by the method outlined above follow.

Study of these results especially (2, 3, 6 and 7) and comparison with the results obtained with the full radiation justified the conclusion that the isolated ultra-violet as here used is, for some reason, much less destructive of bacteria than is the full radiation. As this result was entirely unexpected a careful study was made of the differences in the two methods of irradiation. In the use of the isolated ultra-violet we have as above stated: (1)

TABLE NO. 11.

B. Coli in Slot Slide.

+ = Growth Normal.

No.	Line.	Time.	Results.	Remarks.
1	280 $\mu\mu$	2 hr.	+	Iron arc.
2	253	2 $\frac{1}{3}$ hr.	+	Iron arc.
3	253	2 hr.	+	Iron arc.
4	265	2 hr.	+	Iron arc.
5	280	1 hr.	+	Iron arc.
6	250	$\frac{3}{4}$ hr.	+	Mercury arc.
7	236	1 hr.	+	Mercury arc.

Controls—all normal.

a greater distance from source to emulsion. This affects (a) the direct heating, (b) the intensity by inverse square effect, (c) the intensity through air absorption. (2) The radiation is transmitted through approximately four centimeters of quartz and, further, is weakened through two reflections from the prism faces. (3) The ultra-violet radiations are not associated with any longer waves of greater penetration.

In analyzing these differences it is to be observed that the emulsions were cooled by water or by fan and the temperatures kept low in both methods of exposing. Consequently no effect in either case can properly be ascribed to direct heating. Further, as stated on page 986, the collimation of the light prevented any decrease in intensity due to the inverse square law beyond the collimating lens. In these experiments the effective distance from the source was 25 centimeters—a distance at which the full radiation kills in fifteen minutes or less. In order to settle these points more definitely, and also to study the effect of air absorption, the following experiments with full radiation and long air path were made. In these experiments the distances used (See 1 and 4) are greater than the total path from source to emulsion in the spectroscope. The time required to destroy the bacteria is relatively greater than for short distances but destruction is complete in a maximum of 45 minutes.

In regard to the effect of absorption in the quartz parts of the apparatus and the loss through reflection at the prism faces nothing very definite can be said *a priori*. The effect of the absorption of four centimeters of quartz on the shorter waves might be marked. As for reflection, the reflecting power of quartz in the ultra-violet has not been adequately investigated. Working near the absorption region for ultra-violet as we

TABLE NO. 12.

FULL RADIATION—THROUGH 3 MM. IN GLASS CELLS. (B. TYPHOSUS.)

No.	Distance.	Time.	Results.	Remarks.
1	55 cm.	45 min.	0 (1/cc.)	Mercury arc.
2	55 cm.	15 min.	Retarded	Slightly. Hg. arc.
3	25 cm.	20 min.	Lost	Slightly. Hg. arc.
4	55 cm.	35 min.	0 (1/cc.)	Iron arc.
5	25 cm.	10 min.	contaminated	Iron arc.

Controls—all normal—about 35,000 per cc.

are here we must, however, anticipate a large loss due to reflection at the oblique surfaces. An approximate calculation gave the loss at each surface to be of the order of 15 per cent. Special experiments were therefore necessary to determine definitely the effect of these factors on the destructive action of the full radiation.

EXPERIMENT NO. A.

The apparatus was set up as shown schematically in Fig. 1. The emulsion was contained in a small porcelain crucible (4 mm. diameter at the bottom) and was exposed to the full radiation of the mercury lamp at a distance of 20 mm. The radiation passed through 4.3 cm. of quartz obtained by superposing eleven quartz plates of various thicknesses. A

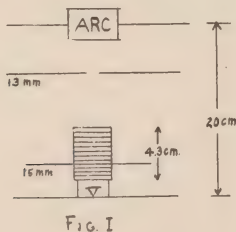


FIG. I

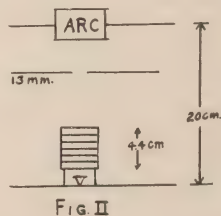


FIG. II

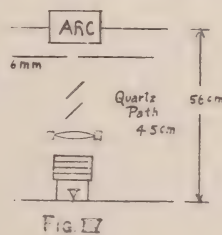
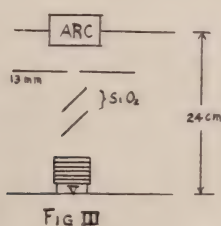
diaphragm under the arc cut the source of light to a circle of 13 mm. diameter. A second diaphragm with an opening 15 mm. in diameter was introduced into the pile of plates. The exposure was for 20 minutes and the destruction was complete. The control contained 30,000 typhosus per cc.—the exposed emulsion 0. Here we have 22 normal reflecting surfaces in the light path.

EXPERIMENT No. B.

This experiment was designed to check Experiment No. A. A single diaphragm (13 mm. opening) was placed as shown in Fig. 2 and the quartz path was made up of 6 plates aggregating 4.41 cm. Here we have, of course, twelve reflecting surfaces. The exposure was for 20 minutes as before. The destruction was practically complete—eight bacteria per cc. surviving. The control showed 35,000 per cc.

EXPERIMENT No. C.

In this experiment the effect produced by oblique reflections was investigated. Two quartz plates were set in the light path at angles equal to those offered by the prism faces in the spectroscop. In addition quartz plates were used giving a total quartz path of 4.5 cm. and an air path of 20 cm. (Fig. 3) The exposure was for 30 minutes. Destruction was complete—the control showing 35,000 per cc.—the exposed emulsion 0.



EXPERIMENT No. D.

The effort was made here to reproduce the conditions in the spectroscop in regard to air-path, quartz-path, reflections and total irradiation. The apparatus was set up as shown in Fig. 4. The diaphragm opening was reduced to 6 mm. diameter. In the light-path were two oblique plates, one biconvex lens and four horizontal plates. The quartz path was 4.5 cm.—the air path 51.5 cm. We have here a longer air path than in the spectroscop—a longer quartz path, as many oblique reflections and, in addition, eight normal reflecting surfaces. The area over which the light that came through the diaphragm opening was diffused was measured and the ratio to the area of the crucible taken. This showed that 1-180 of the light that came through the hole fell on the emulsion. The area of the slit of the spectroscop was also measured and the area of diffusion in the plane of the collimating lens. This showed that 1-12 of the light that came through the slit fell on the lens. Calculations based on this data show that approximately twice as much ultra-violet radiation must fall, in any given time, on an emulsion on the table of the spectroscop as fell on the emulsion in the crucible in this last experiment. The exposure was

for one hour and the destruction was complete. The control developed 30,000 typhosus per cc.—the exposed emulsion 0 per cc.

These experimental results seem to prove conclusively that the destructive action of the light ought not to be in any way diminished in passing through a spectroscopic apparatus of the type and size of the one employed in this investigation.

A final series of experiments was now made with isolated radiations. The mercury arc was used as before. On account of the ease and certainty of sterilization the small porcelain crucible was used in place of the slotted glass slide. Four or five drops of the emulsions were used and controls made up with the same amounts. The distances were so taken that the lines used, as located on the fluorescent glass, covered the entire emulsion. In order to make absolutely certain of this point the crucible was rotated in the line during exposure at the rate of one revolution in 45 minutes, by a small clinostat. The adjustments were very carefully made and checked repeatedly during runs. The results are summarized in Table No. 13.

The following facts seem evident from these results. Marked destructive effects can be produced by isolated ultra-violet rays 250 $\mu\mu$ or less provided sufficient time is taken. A three-hour exposure is necessary in order to produce a marked result with $\mu\mu$ 250. The destructive effects increase on moving into the shorter wave-lengths—a one-hour exposure in $\mu\mu$ 220 being equivalent to three hours in $\mu\mu$ 250. However even for these rays ($\mu\mu$ 220—the shortest given by the quartz mercury arc) a five-hour exposure does not accomplish complete destruction.

Comparison of these results with those obtained with the full radiation (Table No. 12, see page 988) forces us to the conclusion that the effectiveness of the mercury arc, and similar sources, in killing bacteria rapidly is due to some extent to the association of radiations of greater wave-length and greater penetrating power with the short ultra-violet. Ordinarily the whole effect is ascribed to the ultra-violet. It was thought possible that the comparative ineffectiveness of the isolated rays might be ascribed to absorption in the water of the emulsions but an experiment made with a quartz cell showed that one linear centimeter of normal salt solution plus coli had no apparent absorptive effect on any of the ultra-violet lines—220 or above. It is possible that the longer radiation may render the organisms more susceptible to the action of the shorter—possibly the cell wall absorbs the isolated short waves thus protecting the enclosed protoplasm but the longer radiations, when present, may, in a sense, carry the shorter waves through the cell wall and thus enable them to act destructively on the protoplasmic contents.

This hypothesis can be checked by subjecting emulsions simultaneously to ultra-violet radiation and to longer wave-lengths from a second source.

TABLE NO. 13.

ISOLATED RADIATION OF THE MERCURY ARC. (B. TYPHOSUS.)

Time.	Wave-length.					
	220 $\mu\mu$.		236 $\mu\mu$.		253 $\mu\mu$.	
1 hour	50,000	1				
	cut to 5,000	10				
2 hours			+	1		1
			+	—	+	—
			+	1		1
3 hours	12,000	1	21,000	1	12,000	1
	cut to	—	cut to	—	cut to	—
	150	80	450	50	1,000	12
4 hours	21,000	1				
	cut to	—				
	160	130				
5 hours	12,000	1				
	cut to	—				
	60	200				

Ratio of test to control shown by the fractions.

A few experiments of this kind have been made but the number is not yet sufficient to furnish any definite conclusion. It is obvious also that experiments should be made using the radiations from the three ultra-violet groups recombined for, in the full radiation, these wave lengths act simultaneously.

The results of this work may be summarized as follows. The full radiation of certain sources containing waves below 250 $\mu\mu$ in length, will kill bacteria certainly and rapidly. Isolated ultra-violet of lengths 250–280 $\mu\mu$ will not affect bacteria in one drop of water in a four hour exposure. Isolated ultra-violet as short as 220–225 $\mu\mu$ will kill only after several hours exposure even when the isolated radiation is of the same intensity as that contained in the rapidly destructive full radiation. The destructive power increases rapidly with decrease in wave length. The final conclusion is that the destructive effect of ultra-violet light is in some way dependent on its association with longer radiations.

I wish to acknowledge my indebtedness to Dr. Arthur W. Goodspeed, Director of the Randal Morgan Laboratory of Physics, for assistance in carrying out this work. The examination of the exposed cultures—the counting of the colonies, etc. was done by Mr. Edward Pugh, a special student in Bacteriology, who has been associated with me from the first and whose assistance has been necessary and invaluable.

It is proposed to continue this work along the lines indicated in the paragraph at the top of this page.

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ANTI-TYPHOID VACCINATION.

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Read before the General Sessions, American Public Health Association, Colorado Springs,
September, 1913.

It has long been well known that in certain infectious diseases a single attack protects the individuals from subsequent attacks. In some diseases second attacks are not infrequent, but there is usually a considerable interval between two attacks of any of these diseases, and the inference was that temporary immunity results from each attack. That immunity may result from a comparatively mild attack as well as from a severe one is a matter of common observation and it not infrequently happens that mild attacks are not recognized, which leads to the belief that the immunity is due to inheritance.

The production of immunity by protective inoculations was for a long time limited to a single disease, smallpox, and before the discovery of vaccination by Jenner, inoculations with virus obtained from a smallpox patient were extensively practised, these inoculations giving rise to a mild attack of the disease, followed by immunity which was apparently as complete as that following a more severe attack, contracted in the usual way. This method seems to have been practised by eastern nations long before it was introduced into Europe.

In the infectious disease of cattle, known as pleuro-pneumonia, protective inoculations were successfully made sometime before the demonstration, by Pasteur, of the efficacy of such inoculations in anthrax and chicken cholera in 1880. The natives on the banks of the Zambezi River are said to have caused animals to swallow a certain quantity of the liquid from the pleural cavity of an animal recently dead and thus give them immunity. But the method most extensively employed was that discovered by the Boers in South Africa and consisted in inoculating animals in the tail with serum from the lungs of an animal recently dead. This is also the method most extensively employed in Australia. But it was Pasteur's success in immunizing animals against anthrax that led several investigators to the immunization of laboratory animals against typhoid. As early as 1886 it was found that several small non-fatal doses of typhoid bacilli would protect rabbits against subsequent fatal doses, and in the same year Beumer and Pfeiffer immunized mice with potato cultures of typhoid and, by using small but increasing doses, they were able to give definite protection against a subsequent fatal dose. They suggested the use of sterilized cultures for the immunization of men, but made no investigations themselves. Other investigators made similar reports of work on animals, but as practically nothing was then known of the toxin of the typhoid bacillus, nor of the nature of typhoid immunity, little or nothing came of the work.

In 1892 Wasserman and others showed that it was unnecessary to use living bacilli since killed cultures were equally effective and that the immunizing substance was an integral part of the body of the bacillus. Both filtrates, which had been used to some extent up to that time, were effective only in so far as they contained particles of the bacterial cells, that is, the immunizing material was not the bacillus but a chemical substance or toxin elaborated by the bacillus. All the earlier work on animals was incomplete and unsafe as a guide in the immunization of man, and it was not until 1893 and 1894 that Pfeiffer, working with Wasserman and Kolle discovered the nature of immunity in cholera and typhoid, and elaborated a method of measuring its quantity. The results obtained by tests proved conclusively in both animals and man the possibility of producing a high degree of immunity against typhoid by the use of killed cultures, and so far as is known at present there are the same anti-bodies produced as the result of inoculation as are produced during clinical typhoid. The quantity of agglutinins, lysins, and opsonins seems to be greater after vaccination than after typhoid, and it is, therefore, reasonable to expect that the immunity conferred by vaccination will last for a considerable period. This is a question that can only be answered by statistics and it may be some years before it can be definitely settled. It is assuredly two and a half years, probably longer.

At about the same time as the work of Pfeiffer and Kolle in Germany, Sir A. E. Wright of the Medical Corps, British Army, began the inoculation of men in England, and in 1908 introduced it into the British Army. During the Boer war it was used upon Wright's recommendation and, although no statistics were kept, Wright considered that the disease was reduced one-half and its mortality even more. At the close of the war, however, a lack of agreement as to the value of anti-typhoid vaccination led to a suspension of its use in the army and several commissions were appointed to study the problem with the result that the procedure has been reintroduced and the anti-typhoid vaccination campaign actively pursued. The British soldier is now vaccinated on enlistment and revaccinated every thirty months.

The next extensive use of the anti-typhoid vaccine was in the German Colonial Army in South Africa, during the Herero campaign from 1904 to 1907, where the inoculations were undertaken on the advice of Koch. The medical records of this campaign were carefully kept and give us excellent data as to the value of the protection afforded by artificial immunization. These statistics detail the results observed in 7,287 vaccinated and 9,204 unvaccinated subjects among the troops, the prophylactic being voluntary. In all 1,277 cases of typhoid fever were observed. The typhoid cases, among the vaccinated, were 57 per 1,000 and almost double that among the unvaccinated, while the mortality was 6.5 in the vaccinated and

12.8 in the unvaccinated. The uncertain results obtained in the earlier years was, no doubt, due to the difficulty in obtaining a uniformly potent vaccine, and also it should be noted that smaller doses and fewer injections were given then than now. After the Boer war the work practically ceased in England, due to the adverse criticism arising out of the experience there. It can be said, however, that much of the reluctance to continue the vaccination was due to the very exaggerated idea of the negative phase. This idea of a negative phase was advanced by Wright, who believed that the body lost some of its normal protective agencies during the reaction following immediately after the administration of the vaccine, and in the short interval the man was in a condition of increased susceptibility to natural infection, and he advised against the administration of the vaccine to men who were about to enter endemic areas. It is now the opinion of the best-informed writers that such fears are groundless. Both Leischman of the British Army and Major Russell of our own service see no evidence of a negative phase and there is no known objection to giving the prophylactic to those exposed to the disease or during an epidemic.

The anti-typhoid vaccinations in the United States Army have been done under the supervision of Major Russell, where it began in 1909, and during the next two years two thousand men who were vaccinated gave one case of typhoid fever in a man who was inoculated during the incubation period of the fever. On the other hand, there were 150 cases in 65,000 non-vaccinated men. During the spring and summer of 1911 the United States Government mobilized a maneuver force of about 15,000 soldiers in Texas. These were all vaccinated against typhoid and, in the months during which the maneuvers lasted, only two cases of typhoid developed in the camp. One case was in an unvaccinated civilian teamster, and the other was in an enlisted man of the hospital corps who ran a short and attenuated course of fever. During the same period there were 241 cases of typhoid reported in the nearby cities of Galveston and San Antonio, which places the troops had large freedom in visiting. The War Department was so well pleased with the results in Texas that in June, 1911, an order was issued requiring that all men on enlistment receive the anti-typhoid inoculation. At the close of 1911, Ex-President Taft, in responding to an inquiry of the *New York Times* made of a number of famous personages of what they considered the five most notable achievements of the year just past, gave as the second of his answers: "The demonstration of the complete success of the prophylactic in typhoid fever, as shown by the fact that in the mobilization of 15,000 troops in Texas for three months, there was only one case of typhoid."

Our experience with the typhoid prophylactic in Connecticut began in the fall of 1911 when an epidemic of typhoid fever broke out in the borough of Torrington in September of that year. Torrington is a thriving manu-

facturing town of about 17,000 people. During the epidemic, which was due to an infected water supply, there were 329 reported cases and 35 deaths. The town had no hospital and the nearby cities of Waterbury, Winsted and Hartford gave such help as they could, but cou'd not care for all the cases. The borough had a difficult situation confronting it, which was ably met. A local relief committee was at once organized, \$25,000 was raised by popular subscription, and the Parish House of the Episcopal Church was soon equipped as a hospital where 112 patients were treated. Eighty trained nurses were employed by the committee, some in private families, but most of them in the temporary hospital. What is important as bearing on the so-called negative phase is the fact that forty-five of these eighty nurses were vaccinated immediately they were put to work, the others refusing it. Of the vaccinated nurses not one contracted the fever, while four cases developed among the thirty-five unvaccinated nurses. In all, about four hundred inoculations were made. The cases were all carefully selected and no inoculations were given to persons with a temperature or any indication of ill health. Only one case of fever developed among the vaccinated, which was a man who was taken sick soon after his second inoculation and ran a mild and very short case of typhoid. One physician wrote me that at the outset of the epidemic he inoculated himself, wife and two children, and added, "None of us experienced any ill effect and all had a feeling of safety in the depression and panic that pervaded the community."

The following spring, 1912, Company M, Second Infantry, C. N. G., located at Torrington, sent a request to our adjutant general that they be vaccinated against typhoid before going on the summer maneuvers. This request was referred to me as chief surgeon of the brigade and promptly approved with the recommendation that the same privilege be offered to the other commands. The vaccine was drawn from the War Department at Washington and the inoculations made by the regimental surgeons. About three hundred were thus vaccinated. The offer of immunization was also made to our militia this spring and company commanders requested to bring the matter to the attention of their men. The result was that about six hundred have been immunized this year, so that at the present time we have about one third of our militia vaccinated. The readiness with which the offered vaccination was accepted depended apparently on the influence of the officers. Some companies have their entire membership vaccinated while others have not availed themselves at all of the privilege. The exploiting of anti-typhoid vaccination by the state board of health and others, as well as the vaccination of the guard, has, I think, created some public sentiment in its favor, for physicians tell me that there is a considerable demand for it in private practice.

In the vaccination of our militia we had but one unpleasant occurrence, which was that one case of typhoid occurred in a vaccinated man after his

second inoculation. The story was spread abroad that this was the result of the inoculation. As such a report would prevent us from doing much more immunizing among our militia men, if not authoritatively contradicted, we asked the army authorities at Washington to send one of their medical officers to investigate this case. Major Russell was promptly detailed and came at once to Connecticut. In his report on this case he states "that the blood serum gave a negative agglutination reaction against both kinds of para-typhoid bacilli and that the case, so far as he could judge at that time (during convalescence), was a mild case of typhoid. He further states that there is nothing astonishing in the occasional occurrence of a case of typhoid fever following the administration of the typhoid prophylactic. There have been, up to the present time, in the army, beginning with 1909, a total of twenty-seven cases with one death among the vaccinated. No vaccination has ever yet been devised which gives absolute protection and it is unlikely that we shall ever have such an agent. Vaccination against smallpox is universally conceded to be the most successful vaccination used upon human beings up to the present time, yet everybody knows that the protection given by that vaccine is not absolute. A comparison of the results obtained by vaccination against smallpox and immunization against typhoid fever shows that the latter gives results fully as good as the protection against smallpox. Neither gives absolute protection and some cases are bound to occur each year. It is probable that in this case the typhoid prophylactic diminished the severity of the attack." The vaccine used was from a consignment employed in about 500 other vaccinations, and the city of Waterbury, where the case occurred, is not at any time free from typhoid, but had in 1912 a death-rate of about 19 per 100,000, while that for the whole state is 11.3 per 100,000 of population.

The typhoid vaccines are prepared in a number of different ways; that used in our army service is prepared as stated by Major Russell from a single strain of the bacillus which has been for many years under cultivation, and has practically lost its virulence, these non-virulent bacilli better stimulating the formation in the blood of anti-bodies and produce a less severe reaction in the individual. The bacillus grow luxuriantly on agar. The cultures are incubated eighteen hours, carefully scrutinized for contaminations and then washed off in salt solution. The emulsion is kept over a water bath for one hour at a temperature of 55° to 56° C. in order to kill the bacilli and is standardized by counting the bacilli in an unkilld sample. After cooling, $\frac{1}{4}$ per cent. of trecesol is added as an antiseptic and animal tests are made for living typhoid bacteria or contaminating organisms.

The vaccination is given hypodermically in three doses, each ten days apart, the entire course thus requiring twenty days. The first dose consists of $\frac{1}{2}$ cc., or $7\frac{1}{2}$ minims containing 500,000,000 bacteria, while the

second and third doses are twice as large, containing 1,000,000,000 bacteria each. The inoculations are made under the skin, not into the muscles, and the site usually chosen is the arm at the insertion of the deltoid. The arm should be cleaned as for any other operation and the hypodermic needle sterilized. The army uses, as an antiseptic, equal parts of tincture of iodine and alcohol with which the skin is painted before and after the hypodermic injection.

The most suitable time for administration is about 4 o'clock in the afternoon, as the greater part of the reaction is then over before morning. As already stated no applicant should be inoculated who is not perfectly healthy and free from fever at the time.

The reaction from the inoculations are two—a moderate local swelling and slight fever. These are of short duration and less severe than the vaccination against smallpox. The entire reaction is usually over in forty-eight hours and many persons suffer no discomfort whatever. The usual history following the inoculation is a slight chill and rise of temperature 99 to 100° with indefinite aches in the back and limbs for about twelve hours, and local swelling and soreness at the site of the inoculation. Some have no reaction whatever, and a few individuals are indisposed for two or three days, the more severe symptoms being high fever, headache, nausea and vomiting. Children, as a rule, react less than adults. Women and children should receive doses according to the body weight, taking 150 pounds as the unit. It is believed that increased resistance begins immediately after the first dose, although the degree of immunity is not very high until after the lapse of ten days. The Widal reaction is always positive after typhoid inoculation, appearing within ten days after the first dose and remains positive for six months.

The various commissions which have been appointed in this country and abroad to report on the status of this prophylactic measure have uniformly reported that it is useful, without danger and affords a simple method of diminishing the frequency of typhoid fever. For soldiers in camps, physicians, nurses, travelers, and persons living in endemic territory, it offers a simple means of protection. In civil practice its value has been most noticeable in our hospitals. One of the physicians connected with our homeopathic hospital stated to me recently that for years, to their chagrin and humiliation, and in spite of everything they could do, there had not been a year in which some of the nurses had not contracted typhoid fever in their work, but during the past three years in which the nurses had been vaccinated not a case had developed among them.

It is not to be expected, however, that typhoid vaccination will ever be used as is smallpox vaccination and depended upon for the eradication of typhoid, nor should it be. For that purpose we must continue to depend on and strive for pure water, pure food, proper sewage disposal and other hygienic measures.

AN EXPERIMENTAL STUDY OF THE RELATIVE EFFICIENCIES OF CERTAIN FERMENTATION TUBES.

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An examination of the literature relative to the use of fermentation tubes in recognizing *B. coli* and other gas-formers in routine examination of pathological material, water, food, etc., reveals the fact that there is considerable diversity of opinion, first as to the reliability and constancy of gas determinations made with these tubes; and second, as to the *relative* accuracy of the different forms.

Some investigators have apparently attached great weight to the data obtained through the use of the Smith tube and the Durham tube. For example, Penfold* in his work on the modification of the *bacillus coli communis* by its cultivation on monochloroacetic acid media used the Durham tube in his tests of gas production and formulated new and most important conclusions from the data so obtained. This investigator has seemingly placed great confidence in the use of this tube for making the gas test for diagnostic purposes. On the other hand, there are a large number of workers who use these tubes in making only the so-called "presumptive tests"; and insist on confirmatory tests to establish the data so obtained.

It may be pointed out in this connection that the originator of the Smith tube recognized its limitations. Again, Clark† in an excellent survey of the problem, states that "the unreliability and general inconstancy of determinations made with the Durham tube or Smith tube is, or should be, universally recognized."

Probably the chief fault of both types of tubes is the absorption of large quantities of carbon-dioxide by the medium. Keyes,‡ who was one of the first to recognize the inaccuracies of the Smith tube, devised a method for cultivating the gas-forming organisms *in vacuo*, and then drawing out the gas over mercury for analysis by more accurate methods.

With the evidence at hand it would seem, therefore, that there is very little doubt as to the unreliability of gas determinations made by the methods in common use, but as Clark points out in his criticism of one investigator's work while making a plea for greater care in the analytical procedures of bacteriological chemistry, "unfortunately (he) is not alone

* Penfold, W. J., *Jour. of Hygiene*, **2**, 487 (1911); *Proc. Royal Soc. Med., Path. Sect.*, **4**, pt. 3, 97 (1910-11).

† Clark, W. M., *Science*, **38**, 669 (1913).

‡ Keyes, *Jour. Med. Research*, **21**, 69 (1909).

in the false confidence he has placed in the reliability of the Smith and Durham tube methods of bacterial gas determinations. These instruments, which are useful only in the routine laboratory, are still being widely used in elaborate researches; and the time, therefore, seems ripe to emphasize the errors to which their use may lead, and to plead for greater accuracy in this important test of bacteriological chemistry.

The author of the paper to which reference has just been made makes the further statement, however, which is of particular interest to the authors of this paper, namely, that "the Durham tube while useful as a preliminary qualitative test for gas, is otherwise worthless. It is more inaccurate than the Smith tube" This statement regarding the relative accuracy of the two forms of tubes would probably be challenged by a great many workers. The fact that both forms of fermentation tubes are recommended in the literature and are in general use indicates that there is a division of opinion as to which is the more reliable piece of apparatus.

It was this latter phase of the discussion of the problem which first enlisted the attention of the authors and finally led them to the conclusion that while one form might possess peculiar advantages not possessed by the other forms, yet one might be found to be more dependable in *general* than the other.

With regard to the reliability of gas determinations made by the use of the usual forms of fermentation tubes, it should be noted that, whereas this same problem has been considered by others, the angle of attack has been quite different. Some have chosen to regard it from the standpoint of the effect of using various kinds of media. This has led to a great deal of confusion, inasmuch as the media prepared from animal products varies so much in composition that it is practically impossible to produce a medium with known definite properties. To overcome this difficulty some have proposed formulae for synthetic media which would have a well-defined composition and which could be reproduced from time to time. In the production of such an ideal standard medium the authors believe that the problem of identifying certain bacteria by the production of gas in the fermentation tube will be greatly simplified. Others have done a great amount of work on the bacterium itself. To these persons we are indebted for the discovery of the effect of certain media in producing a strain of bacteria with weakened physiological powers, and that the attenuated forms may actually produce so little gas in certain media that the entire amount may be absorbed by the medium itself.

But since various investigators are at present engaged in problems concerning the relations existing between media and bacteria, and that since these reactions will probably be definitely known in the near future, the authors of this article thought it well to determine, if possible, the effi-

iciencies of the tubes employed, using the media which we now have and which are recognized as standards. There is no doubt that too much dependence has been placed on this means of test for gas formers, and that for this reason many serious errors have been made.

The work reported in this paper was carried out under conditions which were intended to give it a practical bearing on the detection of such gas-producers as the *Colon* group. These tests are so frequently made and so much significance is attached to them that the writers felt justified in determining efficiencies on this basis. It is recognized that the ratio of efficiency may be changed greatly when other media are substituted for that used in this work. Such a deduction is easily made when it is recalled that certain attenuated strains of gas-formers produce so little gas in a broth containing dextrose or galactose as to be entirely absorbed by the medium, and that the same strain may produce twice the volume of gas if dulcitol or mannitol be substituted for the hexose.

But since the work reported here was not intended to take up the matter of bacterial strains, enzymes elaborated, or sugars used, but merely to show the relative efficiencies of the Smith and Durham tubes when used in connection with routine laboratory work and standard media, the data is believed to be of value to all those engaged in such pursuits in estimating the dependence that ought to be placed on the results obtained by the use of these tubes.

For convenience of discussion and in presenting data this paper is divided into four parts: "Method of Procedure," "Tables of Results," "Discussion of Results," and "Summary."

METHOD OF PROCEDURE.

The first problem to be considered was that of the selection of a medium on which to base the work. After a careful study of conditions, especially that of giving the work the greatest practical bearing, standard lactose bile was chosen. In selecting this medium the authors recognized that any attenuated forms of such bacteria as the *B. coli* would be held inert and that, therefore, no gas would be produced. This objection was overcome, however, by a careful selection of bacteria for incubation. It was hoped that such procedure would give added significance to the work for those who use fermentation tubes in connection with presumptive tests for *B. coli* and allied forms in routine work.

Naturally, then, the source of bacteria was of next importance. In order to maintain the object of practicability, water was chosen as the source of supply. This might have offered serious complications but for the fact that in the course of the regular work conducted in these laboratories such samples could be chosen as had previously given positive evidence of the presence of gas-formers in the same medium. Therefore, since both

forms of tubes were used in making the tests of the same samples at varying dilutions, it seems improbable that there should be any serious source of error unless it arise from the dilutions used.

It was decided that the study be conducted with two different dilutions made from the known samples in the standard physiological salt solution. By studying the counts made upon the water used as a source of bacterial supply, it was deemed advisable to use a .1 and a .05 dilution. These dilutions it was hoped would represent fair average tests for the two kinds of tubes.

Ten series of forty tubes each were inoculated and incubated in an electrically heated and regulated incubator at $37\frac{1}{2}^{\circ}$ C. for a total period of seventy-two hours. Each series consisted of ten Smith tubes at each dilution, and ten Durham tubes at each dilution. Readings were made at twelve-hour intervals.

In the series which follow, the figures given represent the number of tubes showing gas at the time indicated at the top of the columns.

TABLES.

SERIES I.

Hours.....	12	24	36	48	60	72
Smith tube (con.).....	0	4	6	7	7	7
Smith tube (dil.).....	0	1	1	1	1	1
Durham tube (con.).....	0	2	3	5	6	7
Durham tube (dil.).....	0	0	0	0	0	0

SERIES II.

Hours.....	12	24	36	48	60	72
Smith tube (con.).....	1	1	2	2	2	2
Smith tube (dil.).....	0	0	1	1	1	1
Durham tube (con.).....	0	2	4	4	4	4
Durham tube (dil.)*.....	0	0	0	0	0	0

SERIES III.

Hours.....	12	24	36	48	60	72
Smith tube (con.).....	0	3	7	7	7	8
Smith tube (dil.).....	0	1	5	6	6	7
Durham tube (con.).....	0	0	5	7	9	10
Durham tube (dil.).....	0	1	7	8	8	9

SERIES IV.

Hours.....	12	24	36	48	60	72
Smith tube (con.).....	0	2	4	5	6	7
Smith tube (dil.).....	0	0	2	3	5	5
Durham tube (con.).....	0	1	2	5	6	6
Durham tube (dil.).....	0	0	1	3	3	5

* (One Durham found broken; regarded as zero.)

SERIES V.

Hours.....	12	24	36	48	60	72
Smith tube (con.).....	0	0	0	0	0	0
Smith tube (dil.).....	0	0	0	0	0	0
Durham tube (con.).....	0	0	0	0	0	0
Durham tube (dil.).....	0	0	0	0	0	0

SERIES VI.

Hours.....	12	24	36	48	60	72
Smith tube (con.).....	0	1	1	2	3	4
Smith tube (dil.).....	0	0	1	2	3	3
Durham tube (con.).....	0	3	4	4	4	4
Durham tube (dil.).....	0	1	3	4	4	4

SERIES VII.

Hours.....	12	24	36	48	60	72
Smith tube (con.).....	0	1	3	4	4	4
Smith tube (dil.).....	0	0	1	2	2	3
Durham tube (con.).....	0	1	1	3	3	3
Durham tube (dil.).....	0	0	0	1	2	3

SERIES VIII.

Hours.....	12	24	36	48	60	72
Smith tube (con.).....	0	0	1	2	3	5
Smith tube (dil.).....	0	0	0	1	1	1
Durham tube (con.).....	0	2	2	2	2	2
Durham tube (dil.).....	0	0	0	0	1	2

SERIES IX.

Hours.....	12	24	36	48	60	72
Smith tube (con.).....	3	4	5	5	6	8
Smith tube (dil.).....	1	2	5	5	5	5
Durham tube (con.).....	1	5	7	9	9	9
Durham tube (dil.).....	0	1	4	5	6	6

SERIES X.

Hours.....	12	24	36	48	60	72
Smith tube (con.).....	0	4	5	8	9	9
Smith tube (dil.).....	0	0	5	8	9	10
Durham tube (con.).....	0	4	5	8	9	9
Durham tube (dil.).....	0	1	3	5	8	8

That each series was inoculated with solutions representing different bacterial counts is evident from the figures given. In fact, the work covered such a wide range of concentrations that some series show low numbers during the entire period of incubation while others are relatively high. Series V, which shows no gas in any tube during the entire time of incubation, was inoculated with a dilution from a particular sample which gave gas in both lactose bile and liver broth in the routine work. However, the bacteria count was particularly low in this case.

In all tables discrepancies are apparent, yet the recorded data represents the average result obtained in this laboratory when working with very high dilutions. It was somewhat consoling, however, to learn that others have experienced similar difficulties.

In Table I, which gives the total number of all tubes showing gas at the time indicated, rather remarkable relationships may be traced. When it is recalled that one hundred tubes were run in each case it would seem that there is no great liability of error in taking an average of the results obtained by the described procedure.

TABLE I.

Hours.....	12	24	36	48	60	72
Smith tube (con.).....	4	20	34	42	47	54
Smith tube (dil.).....	1	4	21	29	33	36
Durham tube (con.).....	1	20	33	47	52	54
Durham tube (dil.).....	0	4	18	26	32	37

Since one hundred tubes were inoculated and incubated in each case, this table gives percentage efficiency direct. Attention should be given to the fact that at twenty-four hours the efficiencies of the two types are identical at each dilution. At forty-eight hours, the Durham tube seems to be 5 per cent. more efficient than the Smith tube in concentrated solutions, while with dilute solutions the Smith tube is 3 per cent. more efficient than the Durham tube. These results agree very well with those published by one* or two others working along similar lines.

DISCUSSION OF RESULTS.

Perhaps the most obvious result of the work done is the irregularity shown by the figures given in the series. For any particular series there seem to be discrepancies which indicate that neither tube may be depended on for anything like accurate results. A closer analysis, however, reveals facts which partly relieve fermentation tubes of the criticism of being so grossly inaccurate. It was pointed out in a previous statement that the series represent a wide variation of concentration. We may expect, then, that some series will show this fact. Indeed, Series X, is an instance of this, for here we find an efficiency at from 48 to 72 hours' incubation which is fairly satisfactory. In other series we find efficiencies greatly reduced. But this is just what we should expect under certain conditions. If a given sample of water has, for instance, three gas-forming bacteria per cubic centimeter, and from this a one-tenth dilution be made, then the sample used for inoculation will contain one bacterium for approximately each three cubic centimeters. Concordant results from the inoculation of ten tubes with this dilution are scarcely to be expected. Indeed, the prob-

* Brown, W. W., *Amer. Jour. Pub. Health*, 3, No. 7, (1913).

ability of getting one or more bacteria with each cubic centimeter used for inoculating the tubes is very remote. However, as the concentration increases, the probability of inoculating each tube in a series increases until we may obtain such results as are shown in Series X.

In spite of the fact that the series shows such a wide range of efficiencies, it is shown that the ratio of efficiency between the two tubes at different dilutions is fairly constant. We find that at the seventy-two hour reading the efficiencies are identical, but that at forty-eight hours there is a slight difference. But since at great dilution neither tube shows a high percentage of efficiency, it matters little which tube be used.

If, on the other hand, practical value be given significance, the relative efficiencies of these two types of fermentation tubes may take a decided and rather unexpected turn. True efficiency, as far as the laboratory is concerned, should properly be based on two factors: first, the accuracy of results possible, and, second, the cost of use and maintenance. With reference to the first factor there is little preference, but if we stop to consider the second factor there may be shown a higher efficiency for the Durham tube. The higher efficiency for the Durham tube in the second factor results from a lower initial cost, consumption of less media, less space needed for storage, greater economy in incubator space, ease of cleaning, and cheapness of replacement.

SUMMARY.

With the use of lactose bile as a medium, the relative efficiency of the Smith and Durham fermentation tubes has been shown to be as follows:

1. From the standpoint of total efficiency the Durham tube seems to be the superior of the Smith tube.
2. If efficiency is based on the accuracy of results obtainable, at twenty-four hours' incubation there is practically no difference; while at a longer period, the efficiency in concentrated solutions favors the Durham tube; and in dilute solutions the Smith tube is more efficient.
3. Since at high dilutions neither tube is reliable, duplicates, or even triplicates should be used whenever possible.

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THE VIABILITY OF THE TYPHOID BACILLUS IN SOUR CREAM.

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Numerous investigations have shown that typhoid bacilli quickly die in sour milk, butter-milk, and other sour milk preparations. The bacilli are killed by the acid produced as is shown by the fact that lactic and butyric acid have been found to kill typhoid bacilli with varying rapidity, depending on their concentration.

Recently it was claimed that the Department of Health need not insist on pasteurization of sour cream, as the acidity would quickly render it safe, should typhoid bacilli be present. The following experiments were undertaken to determine whether this deduction from the results of previous observers was justified. Not only was the rate of disappearance in naturally souring cream determined, but also in sour cream under conditions where overgrowth by other bacteria was eliminated.

TABLE I.

Sour Cream —27,000,000 bacteria per cc. Typhoid Suspension = { 1-10,000 dilution of 24-
Sweet Cream —11,000,000 " " " 30,000 per cc. } hour broth culture used.

1. 50 cc. cream+5 cc. typhoid suspension
2. " " " +1 cc. " "

3. 50 cc. cream+.01 cc. typhoid suspension.
4. " " " +.0001 cc. " "

Mixtures.		4/17.	4/18.	4/19.	4/20.	Total Counts 4/20.	Apparent discrepancy between few typhoid added and per- centage found is due, partly, to inhibition on special plating media.
Sour Cream.	Room Temp.	1.	90%	0.1%	Neg.	Neg.	90,000
		2.	20%	0.1%	"	—	
		3.	3%	0.1%	"	—	
		4.	0.1%	Neg.	"	—	
	Ice Box.	1.	90%	3%	"	Neg.	250,000
		2.	30%	0.5%	"	—	
		3.	20%	0.1%	"	—	
		4.	1%	0.1%	"	—	
Sweet Cream.	Room Temp.	1.	98%	8%	Neg.	Neg.	80,000,000
		2.	40%	5%	"	—	
		3.	20%	Neg.	"	—	
		4.	2%	"	"	—	
	Ice Box.	1.	90%	2%	10%	20%	92,000,000
		2.	45%	0.1%	Neg.	—	
		3.	15%	0.1%	"	—	
		4.	0.1%	Neg.	"	—	

Accurate estimates difficult because of great numbers of non-lactose-fermenting types.

Sweet Cream, Icebox specimen No. 1, was taken out of the icebox April 20, and kept at room temperature. The next day it was negative.

By comparing the results with the different samples it seems that the inability to recover typhoid bacilli was due in part to the overgrowth by other bacteria. To determine how far this was a factor, the following tests were made.

A. To fifty cc. of cream were added 7,000,000, typhoid bacilli. The cream was allowed to sour at room temperature and the acidity as well as the percentage of typhoid bacilli determined.

Plated, at once	Typhoid 90%	Reaction 1.02 acid.*
“ after 24 hours	“ 2%	“ 4.7% “
“ “ 48 “	“ 0	“ 6.8% “

B. Fifty cc. was allowed to sour over night, heated in the Arnold sterilizer and typhoid bacilli added as above. The heated cream gave no growth when plated on agar.

Plated, at once,	140,000 typhoid bacilli per cc.	Reaction 3.6% acid.
“ after 24 hours.	80,000 “ “ “	“ “ “
“ “ 48 “	55,000 “ “ “	“ “ “
“ “ 96 “	4,000 “ “ “ †	“ not tested.
“ “ 120 “	0 “ “ “ ‡	“ 7.6% acid.

From these results it is evident there is a reduction in the number of typhoid bacilli when the acidity rises above 3 per cent.

Because of the contamination of the above series the tests on sterilized sour cream were repeated, using two samples of cream at different degrees of acidity. The mixtures were kept at room temperature.

Plated.	7% Acid.	5.6% Acid.
	No. of typhoid per cc.	No. of typhoid per cc.
At once	375,000	385,000
After 24 hours.	110,000	230,000
“ 48 “	7,800	56,000
“ 72 “	200	3,000
“ 96 “	0	0

To obtain a souring cream, but at the same time to avoid the overgrowth of the typhoid bacilli on the plating medium, cream was inoculated with typhoid bacilli and *B. Metchnikovii*. The mixture was kept at room temperature and the souring for this reason proceeded very slowly.

* Number of cc. of normal alkali needed to neutralize 100 cc. of cream, phenolphthalein being the indicator.

† Contamination, 2,000,000 colonies per cc. in agar. Most of the types do not develop on Conradi.

‡ Total count, 15,000,000.

Days.	0	2	7	8	9	10	11
Reaction.	1.0%	2.2%	5%	—	—	—	10%
No. of Typhoid.	392,000	65,000,000	300,000,000	113,000,000	181,000	2,600	400

Evidently the time required to kill the bacilli is directly proportional to the number of typhoid bacilli present.

Summary. The typhoid bacillus is gradually killed in sour cream by the acids produced, the rate of destruction being proportional to the degree of acidity and the number of typhoid bacilli present. The apparent disappearance of typhoid bacilli in sour cream where the normal flora is present is due in part to the overgrowth of the typhoid bacillus by these bacteria and the difficulty of finding by our present methods the proportionately few typhoid bacilli remaining.

With a moderate contamination, the typhoid bacilli are killed in about four days. With a heavy contamination or where initial multiplication has taken place, a longer time may be required. For this reason a clean cream which soured slowly would be more dangerous if contaminated, as an initial multiplication of the typhoid bacilli would occur and a longer time would be required to destroy the bacilli. Whether under ordinary conditions the overgrowth by the bacteria of the cream is a factor in the death of the typhoid bacilli cannot be determined by our present methods.

ICE CREAM STUDIES IN CINCINNATI.*

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The great interest in bacteriological milk examination shown by public health workers during recent years is well known, and the value of such activity needs no demonstration. Statistics prove that the effect of decreasing the bacteriological content of milk results in decreased infantile mortality; and, in view of this fact, it seems surprising that there is such a widespread lack of interest in the study of ice cream.

Ice cream is a product of milk, subject to the same dangers of contamination, to the same spoilage if not properly kept. Dairymen are vigorously prosecuted if their milk is deficient by a few tenths of 1 per cent. in fat or solids or, in some instances, if their bacterial count exceeds 500,000 or 1,000,000. If a few million bacteria in milk indicates filth, improper handling and, consequently, danger to public health, why should ice cream containing tens and hundreds of millions of these same organisms be sold with impunity?

Many states and cities have either definite or suggestive standards of 500,000 bacteria per cubic centimeter for frozen milk products. So far as we know, however, such rulings are not enforced and only a very small percentage of the commercial ice creams could comply with them. Moreover, unless standards for fat are enforced, competition is unfair, and an inferior article, loaded with fillers and poorer in fat than low grade milk, can be sold at the price of a cleaner and more nutritious product.

The first bacteriological ice cream examinations in Cincinnati were made in 1911. During the summer months of 1911 and 1912, bacterial counts were made upon 67 samples, following the standard methods of the American Public Health Association. The results are shown in Table No. 1.

Evidently there is some cause for such enormous numbers, and some remedy must exist which will effect a reduction. As to the cause, high counts in the original cream and milk, unsanitary factories, and careless handling at once suggest themselves.

Repeated inspections of our ice cream plants were made in 1913, sanitary regulations were enforced, many of the poorer plants discontinued business, and others were extensively remodeled.

The advent of the year 1914 found our ice cream plants in a very satisfactory condition. The quality of the cream supply, bacteriologically, had also improved considerably. While we have no routine cream counts to measure such improvement, it is safe to assume that the great decrease from year to year in the bacterial content of our routine milk samples has been accompanied by a proportional improvement in the cream supply.

* Reported before the Milk Commission on National Milk Standards of the New York Milk Committee, April, 1914.

TABLE NO. 1.

Bacteriological Ice Cream Counts—Summers of 1911 and 1912.

Bacteria per cc.	No. of samples.	Per cent.	
Below 100,001.....	0	0.0	
100,001-250,001.....	4	6.0	
250,001-500,001.....	1	1.5	500,000 and below ... 7.5%
500,001-1,000,001.....	4	6.0	1,000,000 and below.. 13.5%
1,000,001-2,000,001.....	6	8.9	
2,000,001-5,000,001.....	4	6.0	5,000,000 and below.. 28.4%
5,000,001-10,000,001.....	16	23.9	10,000,000 and below. 52.3%
10,000,001-25,000,001.....	19	28.3	Over 10,000,000..... 47.7%
25,000,001-50,000,001.....	4	6.0	
50,000,001-100,000,001.....	3	4.4	
Over 100,000,000.....	6	9.0	
	67	100.0	

Minimum..... 200,000 bacteria per cc.

Maximum..... 400,000,000 bacteria per cc.

Practically all of our retail milk is now pasteurized, as well as a large percentage of the cream used by ice cream manufacturers.

It was natural, then, to expect that ice cream samples taken this year should be of lower bacterial content than earlier samples. Thirty-nine samples of plain vanilla ice creams, representing the products of all factories working at that time, were collected during the first week of March, 1914. The ice creams were said to be from two hours to three days old. The bacteriological results are shown in Table No. 2.

This table indicates that cleanliness and pasteurization have accomplished very satisfactory results. The counts are considerably lower than any that we are able to find in reports and journals on file in our office. It should be borne in mind, however, that this comparatively low bacterial content is also partly due to the cold weather prevailing at the time of sampling. Routine milk examinations indicate that the bacterial content depends greatly upon the temperature, and cream, both raw and pasteurized, will also show the same seasonal variations.

As a result of the above tests and of laboratory experiments outlined below, our Food Inspection Department has issued orders that all cream used in the manufacture of ice cream must be pasteurized. Some time will be required before the equipment necessary to pasteurize the entire

TABLE NO. 2.

Bacteriological Ice Cream Counts, March 1914.

Bacteria per cc.	No. of samples.	Per cent.	
Below 100,001	8	20.5	
100,001-250,001	15	38.5	
250,001-500,001	4	10.2	500,000 and below . . . 69.2%
500,001-1,000,001	5	12.8	1,000,000 and below . . 82.0%
1,000,001-2,000,001	3	7.6	2,000,000 and below . . 89.6%
2,000,001-5,000,001	1	2.6	5,000,000 and below . . 92.2%
5,000,001-10,000,001	1	2.6	10,000,000 and below . 94.8%
10,000,001-25,000,001	1	2.6	Over 10,000,000 5.2%
25,000,001-50,000,001	1	2.6	
Over 50,000,000	0	0.0	
	39	100.0	

Minimum 60,000 bacteria per cc.

Maximum 35,000,000 bacteria per cc.

Presumptive Test for B. Coli, Lactose Bile.

Per cent. of samples positive in 0.1 cc.	53.8
Per cent. of samples positive in 0.01 cc.	25.6
Per cent. of samples positive in 0.001 cc.	15.4
Per cent. of samples positive in 0.0001 cc.	10.8
Per cent. of samples positive in 0.00001 cc.	0.0

cream supply is installed, but the result will undoubtedly be a material reduction in the bacterial flora of the ice cream.

EXPERIMENTAL.

In order to study the effect of various ingredients upon the bacterial content of ice cream, the following laboratory work was undertaken.

EXPERIMENT NO. 1.

Although gelatin is known to carry large numbers of bacteria, very little data on this subject has been published. Samples of well-known household gelatins and of bulk gelatins obtained from ice cream manufacturers were tested. A one-gram portion (passed through a sterile meat grinder if in large shreds or sheets) was allowed to soak in 100 cc. sterile water for about 30 minutes until the gelatin had plumped up and become translucent. The gelatin was then melted by immersing the container in water

not above 40° C. When completely melted, dilutions were planted into media. The results are shown in Table No. 3.

TABLE NO. 3.
Bacteria Per Gram on Various Commercial Gelatins

Brand.	<i>Gelatin.</i> 3 days room temp. 58-68 Fahr.		<i>Agar.</i> 48 hours 37.5° C.	B. coli, per gram, lactose bile, 72 hours, 37.5° C.
	Total	Liquefiers		
Cox's.....	900	*	1,600	*
Knox's.....	300,000	5,000	35,000	Between 10 and 100
Minute.....	750,000	*	900,000	Between 1000 and 10,000
Jell-O.....	3,500	*	5,000	Between 10 and 100
Clarkson's†.....			300	*
French Gold Label.....	500	100	300	*
French Silver Label.....	11,000	100	12,000	Between 10 and 100
Bulk.....	400	*	1,400	*
Bulk.....	60,000	3,500	700	*
Bulk.....	1,000,000	120,000	750,000	At least 100,000
Bulk.....	2,500,000	50,000	900,000	*
Bulk.....	4,000,000	60,000	900,000	*
Bulk.....	11,000,000	8,000	6,800,000	*
Bulk.....	15,000,000	40,000	5,200,000	*

* None found on 0.1 gram. † Salesman's sample.

EXPERIMENT NO. 2.

A batch of ice cream was made in a two-quart hand freezer, all parts and utensils being sterile. The materials used were: 1 liter sterile cream ($\frac{1}{2}$ hour at 15 lbs. steam pressure), $\frac{1}{2}$ pound granulated sugar, $\frac{1}{2}$ ounce vanilla powder, 3 beaten market eggs, and 1 ounce of gelatin.

The gelatin used was that showing a count of 11,000,000 on gelatin and 6,800,000 on agar media. This was dissolved by soaking and warming in sterile water below 40° C. before adding to the mixture. All bacterial results shown below were obtained on nutrient agar at 37.5° C., 48 hours, and in lactose bile 37.5° C., 72 hours.

The beaten eggs showed 300 colonies per cc. with no coli in 1 cc.

The vanilla powder showed 300,000 bacteria per gram with no coli on 0.1 gram.

The sugar yielded only 200 colonies per gram with no coli on 0.1 gram.

The ice cream made as above contained 120,000 bacteria per cc. with no coli in 1 cc. but present in 10 cc. portions.

Obviously this count is derived almost entirely from the gelatin, and is 82 per cent. of the number that we should expect to find, based on calculations taking into account the bacteria on the raw material and the volume of the mixture before freezing. Such calculation indicates that $\frac{1}{2}$ pound sugar and 3 eggs per liter of cream have practically no effect, and vanilla powder comparatively little upon the number of organisms in ice cream.

EXPERIMENT NO. 3.

The preceding experiment was repeated, omitting the eggs and using but $\frac{1}{8}$ ounce gelatin.

The ice cream contained 15,000 bacteria per cc. with colon organisms present in 10 cc. but absent in 1 cc.

This amount of gelatin is somewhat higher than that usually used by manufacturers, and apparently such an amount furnishes only a small percentage of the bacteria ordinarily found in frozen milk products. Moreover, had the gelatin been dissolved by the usual method of scalding instead of by merely warming, the great majority of organisms found in this experiment would have been destroyed.

EXPERIMENT NO. 4.

A batch of ice cream was made using 1 liter sterile cream, $\frac{1}{2}$ pound sugar, and 1 ounce of vanilla powder.

Disregarding the very few organisms that might gain access from the air, the bacterial content of this ice cream is derived entirely from the vanilla powder, which in this case should yield 7,600 bacteria to each cubic centimeter of the ice cream. Of this number, 6,500 were found, with the colon bacillus present in 10 cc. and absent in 1 cc.

The three preceding experiments prove that the numbers of bacteria introduced by sugar, gelatin, eggs, and vanilla powder are but very small percentages of the numbers usually found in commercial ice creams, and it follows that the cream must furnish the vast majority of such organisms.

EXPERIMENT NO. 5.

Ice cream was made with the following materials: 1 liter of raw cream containing 7,300,000 bacteria per cc. with colon bacilli present in 0.0001 cc. and absent in 0.00001 cc., $\frac{1}{2}$ pound sugar, and 1 ounce vanilla powder. The resulting ice cream contained 11,000,000 bacteria per cc. and the same colon content as the raw cream.

The increased number in the frozen product is very likely due to unequal distribution of organisms. The results of other workers indicate no definite relationship between bacteria in the cream and in the ice cream,

the latter in some cases showing one half, in other cases three times the content of the cream.

EXPERIMENT No. 6.

A 1-liter portion of the raw cream used in the preceding experiment was pasteurized in a flask for 30 minutes at 143–146° Fahr. It was then cooled and allowed to stand 24 hours at 55–60° Fahr., in order to approach commercial conditions.

After this time, the pasteurized cream contained but 3,800 bacteria per cc. (99.9% efficiency) with no *B. coli* in 10 cc. Ice cream was then made from this cream, using $\frac{1}{2}$ pound sugar and 1 ounce vanilla powder, and the frozen product contained 12,000 bacteria per cc. with colon bacilli present in 1 cc. but absent in 0.1 cc.

CONCLUSIONS.

The preceding experiments prove that sugar and eggs have practically no effect upon the bacterial content of ice cream. Vanilla powder and gelatin as ordinarily used introduce comparatively few bacteria, the great majority being derived from the cream.

Proper pasteurization of cream would yield ice creams which could easily comply with the 500,000 standard.

On account of the wide distribution of the colon bacillus, it appears that the best and most carefully prepared ice creams will show this organism in 10 cc. and occasionally in 1 cc. portions.

Those batches made from sterile cream had only a slightly scorched taste, not noticeable to the consumer until attention was called thereto. Properly pasteurized cream would not affect the taste of the ice creams.

CHEMICAL EXAMINATIONS.

All of the samples taken this year were examined for percentage of butter fat and for the presence of gelatin and starch, with results shown in Table No. 4. Tests for saccharin and foreign fats were negative in all cases.

Ohio has no fat standard for cream. As a result, the richness of our ice creams will not compare with that of localities where cream is legally defined. A standard for fat in ice cream should not be considered until cream standards are enforced, as the ice cream manufacturer is at the mercy of the milk dealer.

TABLE NO. 4.
Summary of Chemical Examinations.

Per cent. fat.	No. samples.	Per cent.	
Below 5.0	2	5.1	
5.1-7.5 inclusive	10	25.7	
7.6-10.0 inclusive	13	33.3	10% and below 64.1%
10.1-12.0 inclusive	2	5.1	12% and below 69.2%
12.1-14.0 inclusive	6	15.4	14% and below 84.6%
14.1-16.0 inclusive	4	10.3	Over 14% 15.4%
16.1-18.0 inclusive	2	5.1	
Over 18.0	0	0.0	
	39	100.0	
<hr/>			
Minimum fat		4.2%	
Maximum fat		17.4%	
<hr/>			
Per cent. of samples containing gelatin		51.3	
Per cent. of samples containing starch		20.5	
Per cent. of samples containing gelatin and starch		2.6	

GENERAL CONCLUSIONS.

The bacterial content of ice cream is usually so high that studies of the cause are imperative.

Cream is obviously the source of the great majority of bacteria found in ice cream.

Proper pasteurization of the cream and enforcement of sanitary regulations will reduce the bacterial count in ice cream.

Pasteurization of the mixture just before freezing would bring about a still greater reduction. Pasteurized cream does not affect the taste of ice cream.

Sanitation at the dairy must not be neglected, but proper refrigeration and transportation facilities in large cities are far from satisfactory. A perfect product at the source of supply may be teeming with bacteria by the time it reaches its destination, and under the present conditions, pasteurization is the only remedy.

Chemical, bacteriological and sanitary standards for ice cream should be established and enforced. This would insure a cleaner and safer product for the public, give the physician some idea as to the quality and richness of the product for invalids and children, and place competition upon a fair basis by eliminating the unscrupulous manufacturer.

STUDY OF A SWIMMING POOL WITH A RETURN PURIFICATION SYSTEM.

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Massachusetts Institute of Technology, Boston.

Read before the Laboratory Section of the American Public Health Association, Colorado Springs,
September, 1913.

During the last five years, considerable interest has been aroused concerning the sanitation of the indoor swimming pool. More or less thorough investigations have been made in a number of places and in particular the effect of hypochlorite as a cleansing agent has been studied both from a chemical and a bacteriological standpoint. In most of the pools so investigated, water has been obtainable in practically unlimited quantities, and in general it has been the policy of those in charge of such pools to completely empty and refill the tanks about once a week.

There are, however, many places where the cost makes such a frequent change of water well nigh prohibitive, where the time consumed in this way interferes with the use of the pool, or where the necessary amount of water is not available. Such conditions exist for the most part in connection with Y. M. C. A. and social center organizations. Many of these have installed some sort of purification systems whereby water is returned to the pool after passing through a filter. Hypochlorite is sometimes used in addition; in some cases hypochlorite is used alone without any filtration.

During the winter of 1913 the author had the opportunity to make a sanitary study of the Cambridge (Mass.) Y. M. C. A. pool, and the results seemed of sufficient interest to report.

That a swimming pool should be kept clean is obvious, but if there are any doubts they will be quickly dispelled by a survey of reported cases of both intestinal and external infection which have been traced beyond reasonable doubt to bathing or swimming in polluted water. For this you are referred to a paper by Atkins in the Proceedings of the Illinois Water Supply Association for 1911.

Cleanliness in a swimming pool can be divided into two kinds, physical and bacteriological. To a large extent these two are interwoven, but at the same time the author knows of at least one pool where a purifying system was installed in order merely to remove the color from the water. No one cares to swim in a highly colored or turbid pool any more than they care to drink such water even if assurance is given that the water is perfectly safe. Unfortunately, most people are not so particular about outdoor bathing. The problem, then, for the caretaker of a pool is twofold: to keep the water and sides and bottom of the tank in good physical con-

dition; and to sterilize or purify the water sufficiently to remove danger of infection. In the pool about to be described, a fairly successful attempt was made to do both of these.

The Harvard tank at the Cambridge Y. M. C. A. is 60 feet long by 20 feet wide and varies in depth from $3\frac{1}{2}$ to 7 feet. The capacity is 55,000 gallons. The water is supplied by an artesian well on the premises about 400 feet deep, through a pump of 50 gallons a minute capacity. Around the tank, just above the water line, is a splash board connected with the sewer except at the shallow end of the tank where it serves as a trough to admit water to the pool. The outlet is in the bottom of the tank near the deep end. The purification system consists of a closed filter 6 feet high and $4\frac{1}{2}$ feet in diameter filled with quartz pebbles through which water from the tank may be pumped at the rate of 50 gallons per minute. This means a rate of 63 million gallons per acre per day. In front of the filter is a by-pass, controlled by a needle valve, leading through a cylinder filled with sulphate of alum. The alum is thus dissolved slowly and mixed with the main supply from the tank. The amount used varies from one-fifth to one-half a grain per gallon. The filtration is carried on only during the day time. The filter is cleaned each day by reversing the current. When necessary, the filtered water is passed through a heating coil in order to keep the temperature of the tank as nearly as possible at 70° F.

At night, after all users have left the pool and the filter shut off, one pound of hypochlorite of lime is dissolved in the water by wrapping it in a piece of cheese cloth attached to the end of a pole which is moved about the surface of the pool. The water remains quiet during the night. The first thing in the morning the sides and bottom of the tank are cleaned by a brush connected with a suction pump—an arrangement similar to the ordinary vacuum cleaner. Then enough water is added from the well, usually about 5,000 gallons, to replace that lost by splashing the day before and by the cleaning process.

The number of users of the tank is smaller than in many places, being from 400 to 500 each week. As usual, a shower bath is required before entrance to the pool.

The test was carried on in the following manner. The tank was completely emptied and the sides and bottom cleaned. It was then filled with the artesian well water, a sample of which was collected and examined both chemically and bacteriologically. The filling required about eighteen hours. The first sample was then collected from the tank. As previous observers had shown that there was little variation in the water in different parts of such a tank, one sample only was collected from about the middle of the tank. The tank was then thrown open for use and the filtration started. No hypochlorite was used for two days during which time 125 swimmers used the pool. The second sample was then taken. This was immediately

followed by the addition of hypochlorite. Samples were then collected at first twice a week and later once a week at noon on the days mentioned. This was done in order to observe the condition of the pool at the time users first entered it, and was thought to be the best way to show the effect of the purifying system.

The following examinations were made: physical—color, odor, turbidity and sediment; bacteriological—total count on nutrient agar at 20° C., and on lactose litmus agar at 37°, acid colonies on the latter medium, and gas production in dextrose broth; chemical—nitrogen as free ammonia, albuminoid ammonia, nitrites and nitrates; chlorine, and oxygen consumed. The results are given in the following table:

Bacteriological Results.							Chemical Results. (Parts per million.)						Remarks.
No.	Date.	Agar at 20°. No. per cc.	Litmus lactose agar at 37°. No. per cc.	Gas formers per 5 cc. Acid colonies per cc.	Nitrogen as				Chlorine.	Oxygen con- sumed.			
					Free NH ₃ .	Alb. NH ₃ .	Nitrites.	Nitrates.					
1	Feb. 24	110	200	0	0	0.001	0.014	0.0	0.09	30.8	0.29	Artesian well supply.	
2	Feb. 24	6,000	7,000	1	..	0.006	0.026	0.0	0.12	31.6	0.29	Swimming tank.	
3	Feb. 26	4,300	6,500	10	..	..	..	..	..	29.6	..	No hypochlorite added.
4	March 3	20	140	0	..	0.022	0.072	0.001	0.18	33.2	0.48	Hypochlorite added on March 2.	
5	March 6	12,000	20,000	1	..	..	..	..	..	36.0	..	} Suspension of alum noticed in tank.
6	March 10	3,500	18,000	1	..	0.143	0.100	0.002	0.24	34.4	0.67		
7	March 13	.....	.....	0	0	.....	.....	.....	.....	.....	.....	Water clear again.
8	March 17	6	6	0	0	.....	.....	.....	.....	.....	.....
9	March 20	42,000	30,000	0	0	0.054	0.056	0.0015	0.15	40.0	0.95		
10	March 27	150,000	180,000	10	40	0.280	0.070	0.010	0.10	42.4	0.71		
11	April 3	398,000	300,000	3	20	0.066	0.112	0.400	0.10	31.2	0.95		
12	April 10	180,000	50,000	0	0	0.096	0.060	0.200	0.13	36.0	0.83		

We realize that this data is not as complete as we would desire but certain tendencies seem to be quite evident. These will be shortly described.

Tests were also made to determine the bacterial reduction in the filter and heating coil. Samples were collected before the water entered the filter, between the filter and the heating coil and just after the coil. The results follow:

BEFORE ENTERING FILTER.

	Bacteria per cc.
Agar at 20°	454,000
Litmus lactose agar at 37°	330,000
Acid colonies	12

AFTER PASSING FILTER.

Agar at 20°	88,000
Litmus lactose agar at 37°	75,000
Acid colonies	5

AFTER PASSING HEATING COIL.

Agar at 20°	2,700
Litmus lactose agar at 37°	1,200
Acid colonies	0

The percentage removal of bacteria by the filter was 80 per cent. and by the heating coil also 80 per cent. making a total removal of 99.5 per cent. The actual number of bacteria in the tank cannot, however, be reduced this amount, although there is undoubtedly help from this source.

The results of the physical examination can be briefly dismissed. At no time was any color or odor observed in the water, except for a slight odor of chlorine once noticed when a sample was collected. No complaint on this point was ever received from any swimmers. The water was clear and free from sediment except for a short period when particles of alum were noticed in the tank. A reduction in the amount of alum used in the filter overcame this trouble.

A study of the bacterial and chemical data shows several points of interest. A swimming pool is an ideal incubator for bacteria, particularly those coming from the body, on account of the favorable temperature and the presence of food material constantly being supplied from the users of the pool.

Addition by hypochlorite causes an immediate reduction in the number of bacteria, and this number is kept down by this and the rest of the purifying system, to a reasonable limit for about four weeks. The same thing is true of gas-forming organisms. In the opinion of the author the two main factors in keeping the bacterial count low are the addition of the hypochlorite and the sedimentation which takes place during the night when the tank is out of use, this latter being followed by efficient cleaning. After about four weeks, practically all of the colonies on the plates were of a yellow chromogenic bacillus, which was not further identified. We believe that this organism gradually developed a resistance to hypochlorite, and could be eliminated only by emptying and cleaning the tank. The reduction in number of bacteria noticed in the last sample taken we were unable to follow up as it was thought best to empty the tank. Attempts were made to isolate the *Staphylococcus* from some colonies on the agar plates, but in only one instance was this successful.

Chlorides are not an index of the pollution of a swimming pool, as the variation from the original water was only slight and did not correspond with the bacterial results. This has been noticed by others.

The determination of the free ammonia gives a partial but not entirely satisfactory index of the gas-forming organisms present.

The best index of the bacterial pollution is given by the nitrite determination. This relation between nitrites and total count of bacteria is shown very clearly if the results are plotted. The mathematical relation, nitrogen as nitrites times one million equals total bacteria, may have been only a coincidence.

The whole question as to what standards should be employed for swimming pools is an open one. Although the chances for infection are probably less than in the case of drinking water, still the demand for "clean" water as well as for water free from sewage should be made just as strongly in the case of swimming and bathing as in the case of drinking. That gas-forming organisms alone cannot be used as an index of safety for swimming is evident from the fact that some of the bacteria producing external infections do not come under this head. We feel that more data is needed before any definite standard can be suggested.

I have been assisted in this work by Mr. G. T. Lane, to whom thanks are due for his suggestions and industry.

THE FUTURE OF THE MILK INDUSTRY.

FRANCIS E. FRONCZAK, M. D.,
Health Commissioner, Buffalo, N. Y.

Read before American Public Health Association, Colorado Springs, September, 1913.

No time need be occupied by me before this audience in detailing the particular character of milk, its extensive use, nor its intimate relationship with sickness and public health. I need not waste any time in relating how and where it is contaminated, nor what conditions should pertain to prevent it.

We know that from 10 per cent. to 50 per cent., and even more, of the herds are infected with tuberculosis; that 5 per cent. to 10 per cent. of the raw market milk contains virulent tubercular bacilli, and that it is frequently the media for other infections, and that its bacterial count is generally detrimentally high; and as a consequence of these conditions, it is responsible for thousands of infantile deaths yearly, for a greater part of tuberculosis in childhood, and for a certain proportion of typhoid and other infections.

With these facts in mind, the problem is what way is best to mitigate the conditions and lessen the consequences.

Five years ago, the Buffalo Health Department established a Dairy Farm inspection service, organized and systematized the work of milk supervision, which up to that time had not been feasible.

Recognizing the difficulty in attempting radical changes among a class who largely are very slow to make innovations, unfamiliar with sanitation, and unmindful of the responsibility of milk production, it was determined to limit the requirements to the elementary essentials of cleanliness, care and cooling, and that the requirements for health itself should be sufficiently reasonable to permit general compliance. In other words, not to aim for ideal conditions but to obtain coöperation and betterment gradually and by appeal.

It was aimed to make the inspection educational as much as possible, and to stimulate interest in clean milk by a rational common-sense attitude.

Every kind of unsanitation and undesirable methods were found, with the small producers the greatest offenders; the most difficulty was found in obtaining milk houses and securing their being used, of getting the milk work out of the barn, and introducing the covered milk pail.

Results as a whole have been satisfactory. At the time the work was inaugurated, there were two thousand (2,000) farmers shipping milk, consequent upon inspection the number has been reduced to 1,200. Before supervision, the bacterial count of milk was detrimentally high. Up to

the present time, from 60 per cent. to 70 per cent. is received within the limit of acceptance.

Deductions from the work justify the following:

First. That protection from milk possibilities cannot, under present conditions, be obtained at the dairy farm. Producers are not of a type to appreciate the responsibility, nor to consider other than the commercial side, and the margin of profit which is too small.

Second. The retarding element in betterment of the whole is the small producer who keeps cows largely for manure, whose milk is a minor production, to whom sanitation does not appeal, and from whom compliance is wanting. Their elimination at this time is not feasible without causing a serious shortage in the supply. The policy should be to foster the large producer, who makes milk the principal business, to gradually eliminate the minor one referred to, and the best method to accomplish this is through the permit system.

Third. In order to secure improvement in dairy farm conditions, it is necessary to secure the coöperation of the allied industries, creameries, butter and cheese factories, and likewise the city dealers. As long as a producer, whose product has been rejected by the city, can find a market elsewhere, sanitary correction for improvement will not be made. Likewise it is indicated that there should be a uniform standard of production for milk throughout the state, and between states that are in close association.

Fourth. A most important indication is that coöperation and a definite system of notification between the state authorities and municipalities be maintained in regard to contagious diseases. This deficiency on the part of the state officers is very unsatisfactory. The presence of contagious disease at a dairy farm at the present time is rarely reported by the health officer, and discovery is more often the result of accident, or through outside sources of information. I have spoken on this subject several times before and the New York State Health Department has taken some action on the suggestion.

Fifth. It is in evidence that methods are of far greater importance in production of clean milk than equipment. Some of the best milks coming to the city are from poorly equipped farms but where cleanliness is maintained.

Sixth. That the testing of cattle for tuberculosis is not feasible from the farmer on account of expense and loss of cattle. The serious indication at the present time is protection from tuberculosis through milk. Desirable as it might be, the elimination of infected animals is not feasible, owing to economic reasons, milk shortage, etc. The most practicable method of meeting the situation is by classification of milk and pasteurization. All animals should be tested, and by the state, and the milk pas-

teurized in accordance; and the city should pasteurize all milk not known to come from sound animals. The pros and cons of pasteurization are well known. It is believed, however, that with the present improved facilities for pasteurization by the holding method, it is feasible commercially, and is efficient, safe and desirable, and that there are no practical objections if it is done under proper municipal supervision with specific requirements.

While the public is interested as never before in sanitation and also in milk, the conditions and appreciation in many lines are not fully recognized.

The explanation is that the method of diffusing knowledge is deficient and not systematized. Many health authorities publish valued bulletins containing just the information desired, but it does not reach the body of readers it should. Publicity should be one of the important functions of the health department, as it is one of the most valuable aids in securing results. It is believed that the department should make provision for a certain amount of space in the daily newspapers, and either weekly or monthly, and at stated intervals, publish pertinent matter in the public interest; and, further, that other agencies for disseminating information should be effected. In this way, only, the largest number of people could be reached. It is, therefore, indicated that the departments should maintain a division of publicity and utilize the press; in brief, to avail themselves of every method to advertise health and disseminate sanitary knowledge.

No more important work belongs to the city dealer than the sterilization of the can. To secure acceptable conditions requires constant scrutiny. While the large dealers have facilities and proper methods, the small dealer is wanting. The propriety of maintaining a municipal can-sterilizing outfit located near or adjacent to the railroad station has been under consideration, all cans to be steamed out before they are returned to the country. It is ascertained that such a plant can be made self-supporting and would be readily availed of by dealers who would gladly omit this part of their work.

The small milk dealer, as with the small producer, represents the retarding element of improvement in the milk business. Indications are that the near future will determine the passing away of the small dealer.

With the public demanding a safe milk, with requirements by authorities for conditions to make it so, the small dealer will be unable to comply and by the "survival of the fittest," will gradually be displaced.

Safe milk can only be obtained at an increased cost. Sanitation and cleanliness mean expense. When the public are educated to this point, there will be a demand and supply. But to a large number, increased cost of milk means going without, or its limited use, or the using of prepared milks.

There is no objection to condensed and evaporated milk, provided it is used under proper conditions and is of a definite standard of composition.

Use of powdered milk will appear to be one of the most promising indications; 90 per cent. of milk is water; its value remains in the other 10 per cent. The cost of shipping and handling 90 per cent. of water is a matter of no small importance. There is no question but what the use of powdered milk may offer a solution to a great part of the problem of supplying safe milk at a low cost.

It has the advantage of concentration-keeping properties, and can be made of any degree of richness. At present it is extensively used in industries and by the government. It may determine the availability of supply from distant points.

Few businesses are so directly related to the public health as the milk business, yet the occupation is open to any and all classes who have sufficient capital to equip moderate-sized places and buy a few cans of milk. As compared with other businesses in their capacity for detriment, the druggist may poison or sicken an individual; a plumber, through defective work, a household; but the milk dealer, within a few hours, can disseminate infection throughout his entire route. If it is deemed wise in the interests of the public to license a plumber or pharmacist, how much more is it not important to license a milk dealer? To this end, it is suggested that cities have a milk dealer's licensing board, analogous to the plumbing and pharmaceutical boards, that would be representative and appointive by a disinterested party, the county judge; that he designate two members from representative milk dealers, two others, one a physician from this general public, and that the Health Commissioner designate a member of the Health Department and thus constitute a Board of Examiners. Require each person engaging in the business to obtain a license from this board, and make it a condition that he give a satisfactory knowledge of milk and its relations to the public, and an intelligent understanding of cleanliness and why cleanliness should pertain. It is believed that a requirement of this character will be followed by beneficial results. A dealer with sufficient qualifications could do things understandingly, could appreciate the reasons for the health department's action, and would be a coöperative agent rather than an evader. In all cities, there are dealers who are coöperative with the Health Department milk officials and others who are not, and with the body of dealers as a whole there is more or less lack of information as to the reason of things and a mechanical way of doing same. Betterment in this line can be obtained by the health department conducting a school of instruction for dealers, or a course of lectures teaching the elementary facts in a plain and readily understood manner, say during the winter months. Such instruction could be illus-

trated and simple experiments could be used. The necessity for education is even of greater importance to the dairy farmer. While it is not within the province of the city to go into the country and conduct a campaign of education, it certainly would appear to be the province of the state to do so. A corps of instructors should go through the dairy section and give instruction at stated intervals through the Grange and other associations. It has been suggested that a car be equipped, illustrating the modern sanitary dairy and all the stages of the handling of the milk up to the consumer. In this way, there would be organized a school which would, without doubt, be of great interest to the dairymen and be of profit to the communities.

The householder's care of health is notably wanting. This is the most difficult of all to secure improvements in. One is at a loss to know just how and what would appeal to the average householder. A thought, however, has occurred that through the school children, the householder would be interested more than through many other sources, particularly with the lower and foreign classes, who attribute great importance to everything coming through the schools. It is known that directions of the teacher brought home carry a greater weight and influence not exceeded by any other. If the children were taught the basic elements and instructed to endeavor to secure them at home, it would be an influence.

Another thought is to make a milk bottle an educator, and to have an educational label on each bottle, at stated intervals during certain seasons, with pertinent axioms on it. The bottle coming regularly with its message of instruction would possibly, finally, make an impression. In other words, make the milk bottle an educator as well as a container.

It is believed, also, that if milk dealers would coöperate more by consulting the department records in making contracts by dealing only with farmers whose facilities are acceptable to the department and by requiring in their contracts that certain conditions and uses be maintained, it would be an advantage. If the body of milk dealers followed these lines, farmers would be more responsive. It would also be an advantage if dealers would avail themselves of the health department laboratories to a greater extent. The average health department's facilities for scrutinizing milk are limited. If each dealer reports the condition of his milk when it is not right to the department, it would be an auxiliary aid of value.

Of course, much more could be said on the future of the milk industry and anyone looking over the bulletins issued by the various health departments, dairy bureaus and agricultural associations and divisions, schools, etc., would find some of the ideas which would be of ultimate usefulness and would tend to improve the milk. However, this sketch, in addition to the several I have written on the same subject, is one which I hope and believe deserves some consideration at the hands of interested parties.

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DOLLARS *VERSUS* DEATHS.

The art of sanitation has a widely different basis from those applied sciences which draw their conclusions on mathematical principles. An engineer can calculate to a nicety the cost of a city lighting plant, the cost of its maintenance, and the exact results which will be obtained; and the corporation employing him will be able to determine closely what return the money invested will bring. The sanitarian, on the other hand, while he deals with the costs of public health work in hard cold dollars, finds on the results side of his accounts savings in deaths which cannot be determined precisely, savings in sickness which are still less exact, and sociological and sentimental factors which cannot be determined at all. The biological sciences upon which sanitation is based and the human

material upon which it operates are in their very nature insusceptible of mathematical precision; even the results of vital statistics, "the book-keeping of public health work," require analysis and interpretation which takes account of the fluctuations and inexactitudes of their original data.

Statistics are, however, becoming constantly more accurate and sanitary science more quantitative. Health officers make predictions and promises with more confidence and certainty. And now from Rocky Ford, Colorado, comes a proposal unique in its courage. The health officer of that community, having surveyed the public health situation and made his specific recommendations, addressed his board as follows:

"You gentlemen, as the board of health and legislative council of this community, are directly responsible, and I as your executive officer if I fail to do my part, if another epidemic of typhoid breaks out in our town. . . . I wish I could force this home upon the conscience of every state and municipal legislator in Colorado. . . . A quarter of a century ago this could not have been said. But increasing knowledge brings increased responsibility. . . . This matter cannot be waved aside as a visionary ideal based on impractical theories. . . . We act today on facts. The visionaries were the Pasteurs, the Listers and Flints of the generation preceding us. . . . They were true prophets. . . . So confident am I that what I tell you can be made true here, that I make you this offer. We will take the year of 1913 as a basis; give me the ordinances and regulations, I ask, with authority and funds to enforce them; give me a competent salary so that I may devote my whole time to public health work; if the death rate during the third year is not less by at least three to the thousand, I will return the amount of my salary to the city, and I will put up a bond in the beginning to secure you."

Bold words these, of the sort that shake the inertia of lagging town and city governments. How far the proposal in this particular case is justified we do not presume to judge; the health officer of Rocky Ford has doubtless reckoned up his conditions before making his predictions. The significant point is, as he remarks, that a quarter of a century ago no health officer would have dreamed of making such a promise; today the mere fact that it is made by even one health officer is a sign of the times.

The offer was not accepted and the prediction tested, but with the data now available from fields where definite results have been obtained from definite expenditures and efforts—measured reductions in typhoid fever, diphtheria, and other communicable diseases, in infant mortality, and even in slowly yielding tuberculosis—quantitative forecasts conservatively based on sound data are certainly justified. Already the time is foreshadowed when vital statistics will be comparable in exactitude with financial statistics, and when any excess above an accurately determined "normal" death rate for each community will be regarded as a mark of culpable municipal negligence.

THE INFLUENCE OF THE FINANCIAL STIMULUS IN THE IMPROVEMENT OF A CITY MILK SUPPLY.

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Read before the American Public Health Association, Colorado Springs, September, 1913.

The sanitarian is constantly engrossed in the problems of life and death and he is inclined to resent any attempt to place a financial estimate upon either the life to be saved or the expense of saving it.

Whenever he has made distinct progress in the task which he has undertaken, there has been little disposition to question either his methods or the expense involved. On the other hand, where he has expended large sums of money and produced few tangible results, the layman has been prone to inquire whether some less expensive and more productive methods may not be used.

There is no question but that in many cities the falsification of milk through skimming and watering has been reduced and the conditions under which milk is being handled at the city end has been materially improved. However, when we consider the condition of the milk as it reaches the city, the improvement has been less marked.

Practically every year some city rises up and proclaims that at least in the matter of a milk supply it has joined the elect. When some outsider studies the situation he finds himself in the condition of the spectators before the fabled weavers who were making the cloth, visible only to those who are perfect, and like the spectators in the fable he goes away saddened because he is unable to detect that which he has heard so loudly proclaimed.

As the result of such experiences there has gradually grown up the conviction that the milk supply which is now reaching our cities is undergoing little or no actual improvement. Tuberculosis of dairy cattle is spreading rapidly in practically every dairy state, the amount of cow dung in the milk is being reduced little if at all and the proportion of digestible solids or food value of the milk is steadily falling.

Such being the conditions of the milk supplies it is perhaps not impertinent to suggest that a consideration of the milk question from the economic standpoint may be worth while.

Few hygienists have given careful attention to the economic side of the milk question. Some light is thrown on this side by a recent study made by the New York Agricultural Experiment Station of the milk supply of a city of 13,000. The capital invested in the local milk business was approxi-

mately one half a million dollars or slightly less than \$40 per capita of the city population. Apply this figure to your own population and note the financial magnitude of the business you are undertaking to control. Considered from the agricultural standpoint the capitalization amounts to \$763 per cow of which the producer of milk furnishes \$680 and the retailer \$83. On the basis of observed yields of milk, the farmer must receive 3.5 cents per quart to pay for 6 per cent. interest on his investment and the feed of the cows. Now it happens that 3.5 cents per quart is approximately the average wholesale price of city milk in that region so that on the average the farmer gets merely the manure in exchange for his labor. Truly an unsavory reward for long hours and steady toil.

Under such conditions, the farmer is driven to produce milk in the cheapest possible way. Since milk is quite uniformly purchased by weight or measure regardless of the proportion of fat or other solids, the farmer is compelled to use those breeds which will furnish the largest permissible proportion of water. Failing in these, he adds the water himself, reducing the milk to the lowest amount which will pass the legal standards. Time is money and time spent in cleaning the cows or their surroundings is largely wasted since it brings to the farmer no adequate return in increased market price. On the contrary, foreign matter added to the milk contributes its bulk or weight to the net returns of the market. With these economic forces actively crowding the farmer 365 days in the year, the annual or semi-annual visits of the city inspector make little impression upon the sanitary conditions surrounding the production of the city milk.

If this economic situation is rightly appreciated, it offers the finest opportunity for a steady improvement of milk supplies. Because the basis of payment is weight or measure alone, every economic force now demands the production of cheap, dirty milk. However, under present conditions, the production of even the dirtiest milk leaves little or no margin for profit. Herein is the key to the situation since but a slight change of factors might make the cleaner milk the more profitable.

The delicateness of this balance is illustrated by the experience of one of the large city milk companies. They have found that a bonus of only 10 cents per hundred pounds added to the wholesale price of milk when certain sanitary conditions were changed has worked a remarkable improvement in their milk supply.

There is a growing desire on the part of the public for a safer milk. It is extremely difficult to utilize this desire under present conditions because we have no simple method of informing the people of the relative desirability of the various milks which are upon the market. In the case of the city above referred to, this was met by publishing the score card rating of the dairies. Within a short time the farmers were being paid on a sliding scale, both the producers and the retailers having voluntarily accepted the official score as the basis of payment.

The scoring of the city's milk supply at the beginning of the experiment is given in the chart for 1907, the scorings having been made during the last quarter of that year. This shows that the sanitary conditions in 37.5 per cent. of the dairies were poor, in 57.5 per cent. they were medium and in 5 per cent. they were good. The succeeding chart gives the scorings at the first quarter in 1911 when the sanitary conditions of 87.2 per cent. of the dairies were *good* and 12.8 per cent. were *excellent*.

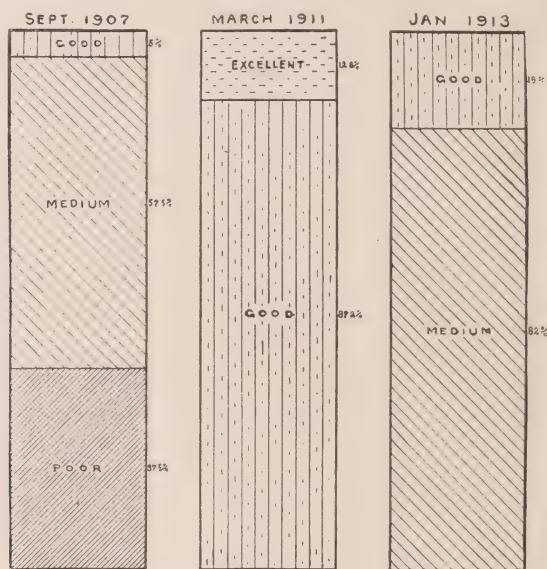


FIG. 1.—CHANGE IN SANITARY QUALITY OF CITY MILK SUPPLY.

In 1911, coincident with one of those changes in municipal affairs, which frequently occur, the scoring was placed in the hands of parties unfamiliar with such work. Under such circumstances it was natural that the inspector should repeat the scores previously given to each dairy. The farmers, finding the score of their milk, and that therefore the price which they would receive for it was no longer dependent upon the sanitary conditions of their dairies, relaxed their efforts.

The sanitary conditions actually surrounding the dairies in January, 1913, on the same basis as shown on the earlier charts is given on the chart for 1913 as 82 per cent. *medium* and 18 per cent. *good*.

Under the combined influence of publicity and the financial stimulus, during four years, this milk supply steadily and markedly improved, but within two years after the financial stimulus was removed, it returned to practically its original conditions. Since the other factors remain essentially the same, this is a good demonstration that the financial stimulus is really the controlling influence in determining the quality of our city milk supplies.

The objection will be raised by the practical sanitarian that financial considerations are outside of their jurisdiction and that it is well-nigh impossible to apply the financial stimulus to the milk business. To the first it should be said that the business of the sanitarian is to safeguard the public health and he should adopt the best methods for accomplishing this end which are open to him. To the second objection, it can be said that, since it has been done, it can be done again, and undoubtedly done much more thoroughly.

The stumbling block in the application of this financial line of attack is the absence of simple and direct means by which we can grade milk in accord with the uses to which it is to be put. The method of grading used in this study was crude and took into account only a portion of the factors which together determine the commercial quality of the milk.

A committee of the Official Dairy Instructors' Association has been charged with the task of perfecting this method of grading until it shall be capable of accurately placing the product of a given dairy in the market class in which the milk from that dairy should be sold, provided it is so handled after leaving the dairy as not to depress its market value.

Since this association is made up of Agricultural Experiment Station men, and is, therefore, most representative of the milk producers, this committee has associated with itself representatives of the retailers and of the Public Health men, representing the consumers, thinking in this way to reach a final result which shall be satisfactory to all parties.

In carrying on this work, I trust that we shall have your best wishes and active coöperation.

MUNICIPAL VERSUS CONTRACT STREET CLEANING IN WASHINGTON, D. C.

J. W. PAXTON.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

Washington, the Nation's capital, is among the few of the important cities of this country—and probably the latest one—to abolish altogether the practice of performing its street cleaning operations under contract, and to take over such operations as a municipal function.

The contract system had been in vogue since the establishment of the present system of government, when, on recommendation of the commissioners of the District of Columbia, Congress, by an act of March 2, 1911, authorized the said commissioners to undertake the work when "In their judgment" it could be accomplished more advantageously to the interests of the District of Columbia.

Accordingly, such operations were commenced as a municipal function on July 1, 1911.

Necessarily during the first year the department was put to considerable expense towards the purchase of new equipment, horses, etc., and naturally many experiments were resorted to and changes made before the forces engaged in the work could be properly organized for so important a task. Notwithstanding these changes in methods as the work progressed, which necessarily impaired the maximum efficiency of the force engaged, but which were dictated by knowledge gained by experience, and notwithstanding also the considerable expense attached to the purchase of new equipment, the office was able to show at the end of the first year's operations that the average costs were less than the contract prices.

At the end of the second year, June 30, 1913, the records disclosed that for the expenditure of the same amount of money, over 25 per cent. more work was accomplished than during the last year of the contract system.

Unfortunately, the quality of the work, being a matter of observation and judgment, cannot be shown in figures, but the whole interest of the municipal authorities in charge of street cleaning, is to have the work well done, while the object of the contractor was to do it well enough to be paid. The stock is largely supplied by horses from the fire and police departments which have become unfit for fast work but are splendidly able to do the work of street cleaning and were originally the best that could be bought. They are kept better and fed better than the contractor's horses. All equipment is kept in perfect condition. The men are well paid, work hard, are employed and discharged according to their ability to work; and thoroughness at all times is insisted on. There seems to be no reason then for the efficiency being less, and the testimony of old employees of the department and impartial citizens who have been sufficiently interested to

observe, is that the streets are in better condition now than they have ever been before.

There are a few general principles which led the authorities in Washington to believe that street cleaning could be done more economically and efficiently by the municipality direct than by contract. They have been proved to be correct by actual experience and being applicable to street cleaning in other cities, the following effort to set them forth may be of interest.

Contractors exist only because they have special knowledge and equipment for doing certain work, acquired through the regular practice of doing similar work, while the other party to the contract is otherwise regularly engaged and only occasionally desires work done which the contractor makes a specialty of.

Apparently this condition does not apply to street cleaning. The work is done every day, year in and year out. There is no question about the municipality being able to finance the operation or purchase the necessary equipment, property, etc. It should be possible to develop and educate the organization far ahead of that of any contractor, especially if the terms of the contracts are short and there is enough competition to make changes in contractors probable.

This being almost entirely a labor contract, it would not be unusual for a contractor to figure 20 per cent. profit, which is more liable to be increased than diminished through insufficient, careless, ignorant or dishonest inspection.

Street cleaning is probably the most difficult work to inspect of any which could be let under contract. No street is ever perfectly clean, only relatively so, depending on the accumulation of dirt and the amount of efficient cleaning. It is impracticable to specify that the contractor shall furnish clean streets or even clean streets at certain periods, but each detail of the required operation of street cleaning must be specified, inspected to see that each detail is carried out, and the city then must be satisfied with results. In order to obtain efficient inspection in Washington under the contract system, it was found necessary in addition to general supervision, accounting, etc., to have an inspector with each gang of cleaners.

Under contract, the necessity for the study of this problem is not usually fully realized by the municipal authorities, and they are invariably unprepared to specify in detail the work which is to be required of the contractor. Sufficient opportunity for experiment and observation is not afforded and therefore improvements are not often discovered. Even if improvements are discovered, changes are difficult, if not impossible, and resulting economy would benefit the contractor and not the city.

On the other hand, when the municipal authorities are directly responsible for the work, it is up to them to make good. All the details intrude

themselves on their notice, changes can be made immediately and the city at once receives the benefit.

For example, under the contract system in Washington changes occurred very slowly and usually only when specifications were made up for new contracts, once in five years, but in the municipal work of the last two years, improvements have been of daily occurrence. Each blockman's work has been studied individually. Time studies with odometers have been made of all vehicular movement. Collections are all made working towards the dumps. Schedules are arranged for all machines, squeegees, flushers, etc., so as to do effective work every moment from the time they leave the stable until their return. Each gang is arranged so as to have the number of sprinklers, machines, broomers, shovelers, carts, etc., in proper proportion. It has been found that some of the wider alleys can be swept to advantage with one-horse brooms, and schedules have been very carefully arranged so as little time will be lost as possible in going from one alley to another. The area of each square, intersection and alley, has been carefully computed and card indexed, and a cost-keeping system has been established in order that comparisons can be made of the cost of cleaning per thousand square yards, each month or oftener, with the similar costs in previous months; or one foreman's work with another doing similar work; or one method of cleaning with another. The office is supplied with a multigraph printing machine so that schedules may be changed and reprinted on a day's notice.

The most radical change in methods has been to increase the hand cleaning combined with an occasional washing and to decrease the machine broom cleaning. The machine brooms raise so much dust that heavy sprinkling is required, the fine dust mixes with the water producing mud, which is smeared on the street by the broom, and when this becomes dry, it turns to dust again. The brooms sweep only the coarser particles and many of these are thrown over the broom by centrifugal force, to the pavement again. Hand cleaning work is capable of better distribution than any other method, because more attention can be given to the dirtier areas by increasing the number of men, who only clean the portions of the street which are dirty and work on these portions until they are clean. There is a fine scum which becomes plastered to the pavements, particularly sheet asphalt, which is not apparent when the pavements are dry but rises up in a thin sheet of mud when moist, making the pavements very slippery. This and fine dust cannot be removed by the hand cleaners, but by washing about twice per week, in addition to hand cleaning, these troubles can be eliminated.

Lastly, but not so important, are the contractors' risks, particularly in lump sum contracts, which the city must pay for, due to the possibility of increasing and shifting business and population, but principally on account of unusual seasons or weather.

TYPHOID FEVER EPIDEMIC—CENTRALIA, WASHINGTON.

EUGENE R. KELLEY, M.D., *State Commissioner of Health, Seattle, Wash.,*
and

STANLEY MACOMBER, C.E., *City Engineer, Centralia, Wash.*

Centralia, locally known as one of the Twin Cities of Lewis County, Washington, and of recent general interest because of a typhoid fever epidemic, is located midway between Portland and Seattle, and derives its support largely through its large natural resources of timber, coal and agricultural lands. It has an estimated population of about 10,000.

The original water distributing system of the city was installed about twenty years ago, the supply being taken from an open well, thirty feet deep, on the bank of the Skookumchuck River. Since the first installation a second open well has been dug and seventy 2" drive wells sunk. These wells are located in a porous gravel sub-soil.

The Skookumchuck coming out of the mountains runs through some twenty miles of very flat, cultivated valley land, the watershed is quite thickly settled for ten miles above Centralia, and there are a few settlements further up. This condition subjects the river water at the pumping station to serious possibility of contamination, although no evil effects had been observed from contamination for twenty-three years until the recent typhoid epidemic.

PROGRESS AND EXTENT OF EPIDEMIC.

On November 1, 1913, the city health officer of Centralia had no cases of typhoid notified. Subsequent investigation seems to corroborate the correctness of the official record.

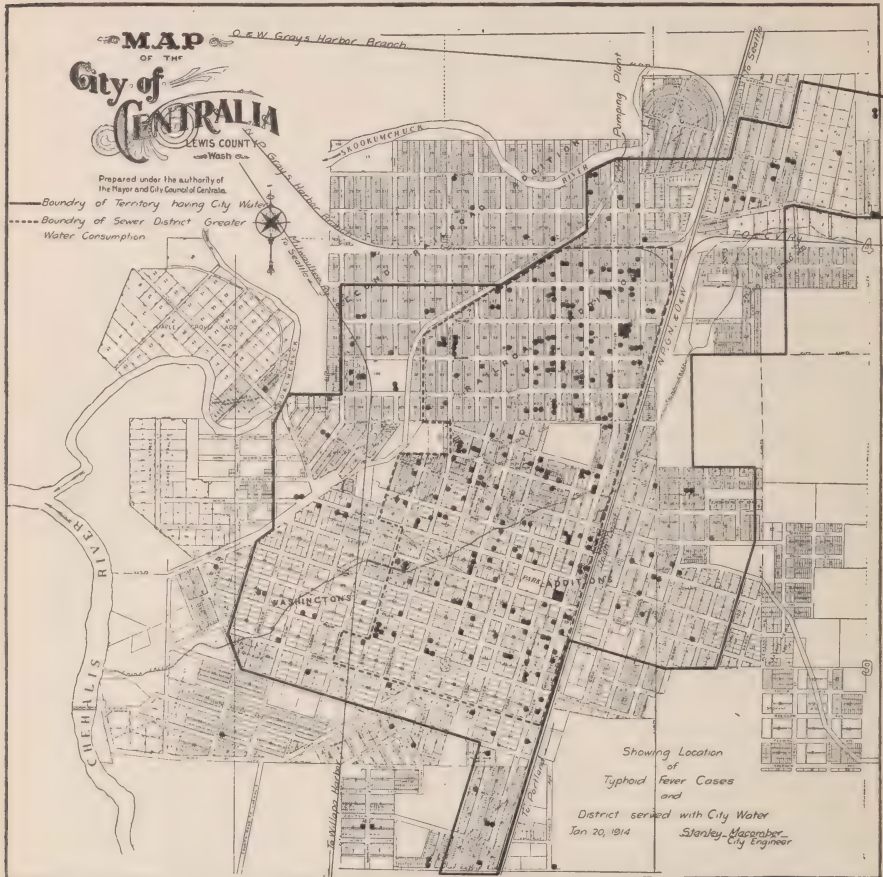
Fourteen cases of typhoid were observed by the local profession between November 1 and 10. This is a number in excess of the average for this city for many years.

For the period from November 10 to November 25 few new cases were reported. From the latter date on, cases increased very rapidly.

There is no evidence that the group of early November cases had any causative relation to the principal outbreak. Whether this preliminary group represents an infection through water of much milder intensity than the later infection, or is to be attributed to other causative factors than water, cannot be definitely decided, but it is very interesting to note that there were two distinct periods of high water in the river, one about the middle of October and the other three weeks later. It would seem at least a reasonable hypothesis that the earlier period of high water might have carried just enough infected material into the city water to affect the extremely susceptible only, while the later freshet carried a more massive dosage, affecting practically all the susceptible portion of the population.

There was no epidemic of diarrhea prior to the epidemic.

In the first week of December the city health officer was struck by the unusually large number of typhoid cases he had seen in his own practice for the preceding few days, and called upon all the physicians to report at once the cases of typhoid and of typhoid "suspects" seen by them within a few days. Within twelve hours, fifty cases were reported. There-



after additional cases were reported with alarming frequency, over thirty new cases being reported on December 15. At the direction and under the supervision of the State Board of Health, on December 12, free anti-typhoid vaccination was instituted, and on December 14 an emergency hypochlorite plant was installed. New cases ceased very abruptly after January 1, as can be noted by accompanying chart. An analysis of the total number of cases made January 20 by the city engineer's office, showed in all 334 authentically reported cases from November 1 to date. Six cases were

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reported from this date to the 1st of February. Careful canvass of the local physicians added ten more previously overlooked, or a total of just 350 cases in all. It is believed that practically every authentic case during the period was reported.

The total number of deaths due to the epidemic were twenty-four; twenty-one deaths occurring locally and three in other localities.

Accepting the local estimate of population, 10,000, would give a morbidity percentage of exactly 3.5 of the entire population.

The mortality percentage of those attacked was 6.5, a rather low percentage considering the severe type of infection.

EPIDEMIOLOGICAL EVIDENCE AS TO ETIOLOGY.

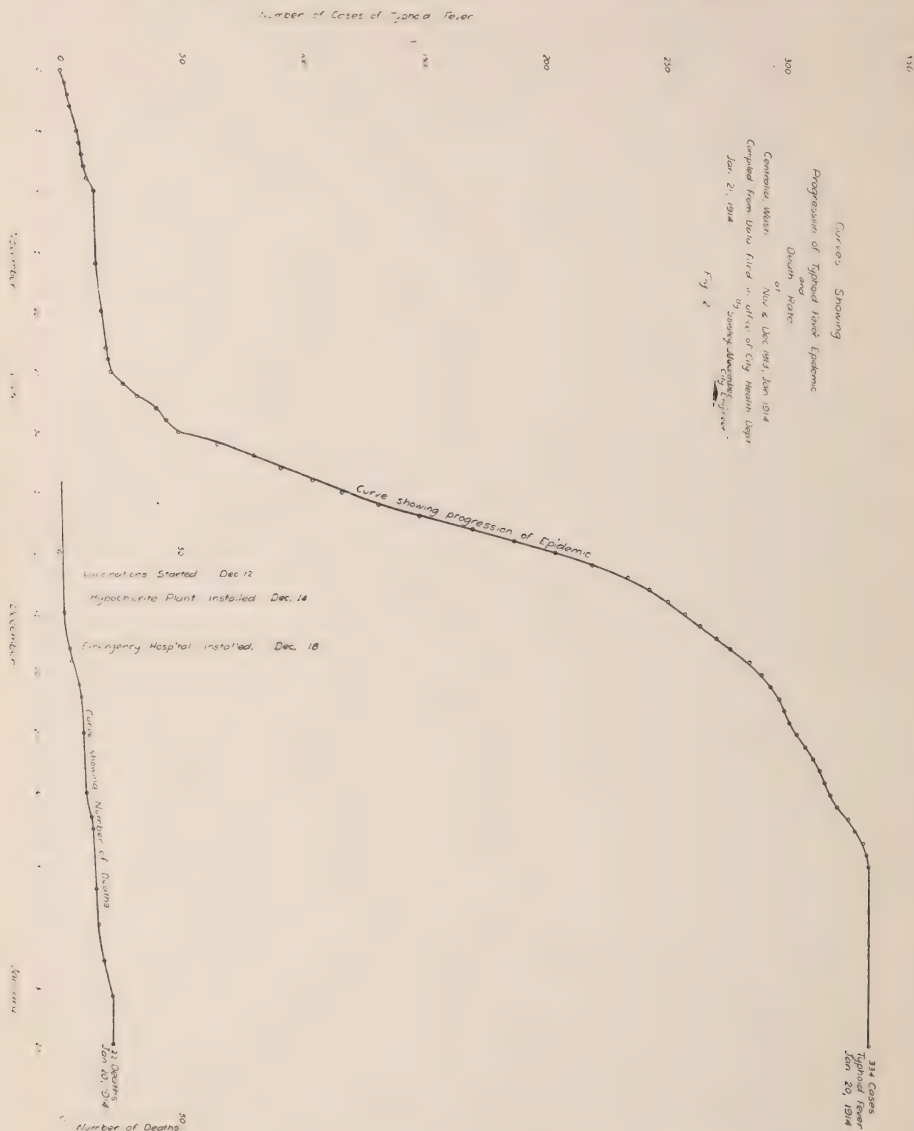
From the beginning the only etiological factors that could be suspected were water and milk. As soon as the State Board of Health was notified of the prevalence of typhoid, an investigation was begun of the cases already reported, with special reference to their source of milk and water supply. The City Health Officer had already correctly diagnosed the outbreak as probably due to a general infection of the water supply, cut off the bubbling fountains in the schools and on the streets, and published a general warning advising boiling of all drinking water. The milk supply was rigidly investigated by both the State Board of Health and the Dairy Division of the State Department of Agriculture. Although no evidence was at any time brought to light which pointed to milk infection, as a precautionary measure rigid regulations relative to delivery of milk to infected premises were enforced, and the state dairy inspector made weekly inspections of all the dairy plants. The thoroughness with which such precautions were carried out accounts for the fact that no case even remotely suggestive of milk infection occurred during the entire epidemic.

Investigation quickly showed beyond doubt that the public water supply was the single etiological factor. Experiments showed that under normal conditions there was a very free seepage from the stream bed to the large dug wells sunk in the river bank.

Corroborative evidence was furnished by the following:

- (1) Proved existence of typhoid cases on the watershed earlier in the autumn. (At least four, possibly eight.)
- (2) The periods of high water corresponding quite clearly to the onset of the epidemic, with proper allowance for incubation.
- (3) The explosive character of the epidemic.
- (4) The abrupt complete cessation of new cases following the installation of the hypochlorite plant, plus allowance for incubation period.
- (5) The truly remarkable preponderance of cases in the portion of the city within the "water" district. Bearing in mind that a considerable proportion of the population, (possibly 25 per cent.) reside outside the

water district, that all the children of school age in the "non-watered" district drank city water at school, and that probably the greater part of the men living in the "non-watered" district used city water while at work, the

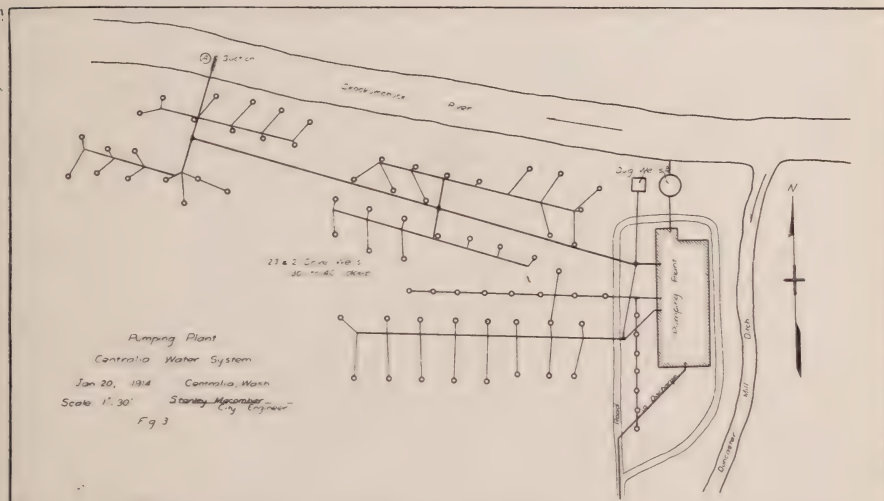


small number of cases developing in this district (14 out of 350) seems good evidence that "dosage" is a very important factor in water-borne typhoid.

The only other point of epidemiological interest as regards transmission is the question of secondary or contact cases.

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There were four contact cases prior to January 7. Since this date corresponds to about the extreme limit of incubation following known complete sterilization of the drinking water, and also as there is direct evidence of contact in most of the cases occurring after this date, it is probably safe to consider all the cases reported from January 7 to March 5 as secondary cases. There are nine such cases. This would give a total of thirteen cases that should be classed as secondary or contact cases. There have been no cases since March 5—a period of three months.



Assuming all cases since January 7 to be contacts, the contact morbidity is low and must be attributed to the very thorough going preventive measures carried out during the epidemic.

Age and sex show no unusual features of distribution. Out of the total 350 cases, in thirty-four instances more than one case occurred in the same house. In six houses there were three cases; in two instances four cases in one house.

ORGANIZATION TO COMBAT EPIDEMIC.

As soon as it was realized that the city was facing an epidemic, a temporary organization was effected to combat the disease.

The work accomplished naturally divides under two distinct headings—prevention and relief.

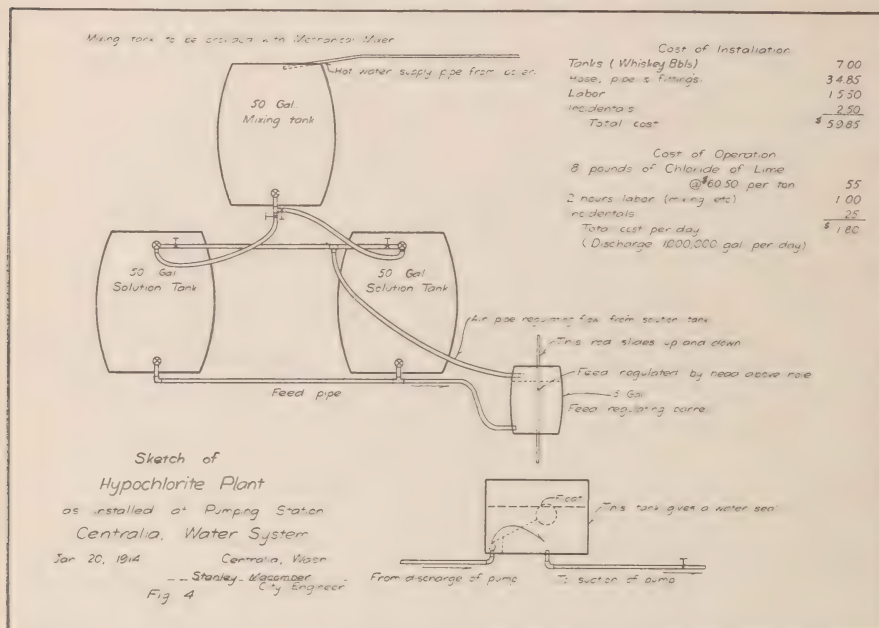
The preventive measures instituted were as follows:

(a) *Installation of Hypochlorite Plant.*

As soon as arrangements could possibly be made, a hypochlorite plant, designed by the State Board of Health's consulting sanitary engineer, was

installed at the pumping station (December 14, 1913). Some difficulty was experienced at first in so connecting it up as to keep air from entering the pumps. This was finally accomplished by making a water seal. The float regulates the flow of water into the tank and the suction pipe to the pump is regulated by a gate. The hypochlorite plant and the water seal have been working steadily ever since installation.

The tanks used were whiskey barrels and after a four months' run, new barrels were installed as the wood in the old ones was gradually being



eaten out. The first dose given was 45 pounds of chloride of lime to 1,000,000 gallons of water consumed. This has gradually been decreased to a steady treatment of 18 pounds to the million gallons used. Bacteriological tests by the State Board of Health laboratory are made twice a week to keep track of the results. All hydrants, reservoirs, etc., were flushed to cleanse the system of contaminated water as soon as possible, but several days elapsed before this end was accomplished. Remembering that fourteen days is the average time of incubation for the typhoid germ, notice the direct results of the installation of the hypochlorite plant on the progression of the epidemic, as indicated by the accompanying chart. This plant was easily constructed at very reasonable first cost, about \$60.00 not counting labor, and has been exceptionally efficient.

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(b) Vaccination Against Typhoid.

Before the State Board of Health was even notified of the existence of a probable epidemic, many of the physicians of the city had begun immunizing with anti-typhoid vaccine.

A free typhoid vaccination clinic was inaugurated in the City Hall by the city government on December 12, four days after the first official notification to the State Board of Health. The State Board of Health laboratory prepared and furnished the vaccine. The city employed a nurse to assist the local and state health officials in administering the vaccine. After a few days the nurse was given complete charge of the work of vaccination, with volunteer lay assistants. The members of the city commission themselves rendered a great deal of assistance in this work. This free clinic was continued daily until February 1, although the last portion of January the clinic was transferred to the office of the county health officer and the services of the nurse dispensed with, as few inoculations were sought.

In all over 9,000 inoculations were given, a few less than 2,600 receiving all their inoculations, 500 took the first and second but did not take the third inoculation, and 342 individuals never returned after the first inoculation.

The physicians of the city report in addition 1,130 complete immunizations given in their practices of which record was kept, making a total of about 3,700 complete inoculations of record, or about 40 per cent. of the total population.

A number of cases developed typhoid following first inoculation—about fifteen in all, as nearly as can be determined. Five authentic cases of typhoid developed following the second administration, and three authentic and two doubtful cases several days after complete immunization. Two or three small painless sterile abscesses developed following inoculation. After careful investigation into this phenomenon the state bacteriologist concluded that this result was due to unusual individual susceptibility to the 0.4 per cent. tricrosol used in preparing the typhoid vaccine, and reduced the strength of the tricrosol to 0.25 per cent. No complications of this nature have been reported since making this change. The United States hygienic laboratory strain of typhoid bacillus was used in making the vaccine. From careful observation of the course of the disease in those cases developing after partial inoculation, the local physicians say they are convinced that the inoculation received in the incubation period certainly did no harm and may perhaps have exerted a favorable effect upon the course of the disease.

(c) General Sanitary Measures.

As soon as time could be taken from relief work, a campaign for a general clean-up was inaugurated. This work was put in charge of the city engineer, and later the city commission by ordinance made that official the permanent sanitary official.

To obtain the best results the city was districted and a general survey made of conditions by the engineer's assistants. Notices were served on persons responsible for premises considered insanitary and arrangements made to remove all rubbish, etc. Metal fly-top garbage cans were ordered to take the place of all wooden garbage receptacles. All manure piles were ordered enclosed in fly-tight boxes. In the sewer district all places were ordered connected to the sanitary sewers, and open toilets completely abolished. Where no access to sanitary sewers could be had, open toilets were put in good condition and ordered treated with lime once a week. The aim was to make the city and the surrounding country as sanitary as possible. In furtherance of this work there have so far been recorded: 920 written notices sent out, 5,208 inspections made, 110 sewer connections, 106 open toilets abolished, 731 open toilets rebuilt. The sanitary condition of the city at present is fairly good but work will be continued along this line. It is believed that these measures have greatly tended to decrease the number of secondary cases incidental to an epidemic of this kind.

(d) Disinfection, Educational and Home Visiting Work.

As soon as the number of cases became so great that it was difficult for the local profession to even see all the cases, two nurses were employed by the city as visiting nurses, working under the immediate supervision of the county health officer. This arrangement proved a most excellent one. These nurses visited practically every case as soon as reported, regardless of social condition, leaving both verbal and printed disinfection instructions, reported cases which needed hospital care, filled in data that was missing on original case report, and, in several instances, learned of new cases and reported them to the city or county health officer for investigation and verification before they had been seen by any physician.

The sanitary inspector was kept almost continuously busy in placarding houses and (later) in removing placards. As far as possible he worked in conjunction with the visiting nurses. The placarding of houses is required by state law, but it also proved a very practical measure in other ways. It enabled the nurses to readily locate premises, thus saving much valuable time in cases of imperfect address, or where street numbers were lacking. It served as a very practical guide for the milk wagons, which were working under special regulations laid down by the state dairy division, thus enabling them at once to tell typhoid premises. Unquestionably, the mere presence of the warning placard served as a deterrent to

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needless visiting, and, hence, helped to keep down the number of contacts, while the daily visits which the nurses made to those homes where there was especial need for close observation, removed the possibility of any families where there were sick, suffering from lack of visitors.

In addition the visiting nurses did a small amount of bedside nursing in some of the poorer homes, but experience quickly showed that removal to the emergency hospital was much superior to furnishing nursing care in the home, in houses where complete sanitary conveniences were lacking.

The local press throughout rendered valuable assistance, daily printing proper methods for precaution and advising typhoid vaccination.

RELIEF MEASURES.

There is remarkably little pauperism in Centralia, as little, perhaps, as can be found in any city of ten thousand population. But because the city is a railroad and lumbering and mining center, there is a very large floating population which, under normal conditions, is accommodated in rooming and boarding houses. This class of population in time of epidemic can only be satisfactorily cared for by hospitalization. From the standpoint of hospital accommodations the city is also unusually well equipped for its size, having in all over one hundred permanent hospital beds.

Yet it soon became evident that the local hospital facilities would be entirely inadequate, and the county board of health obtained permission from the governor and state adjutant general to convert the local militia armory into an emergency hospital. The governor ordered the hospital corps of the National Guard to proceed to the local armory on active duty. After the hospital had been opened a few days, arrangements were made whereby one of the surgeons of the hospital corps of the Guard remained as a resident physician at the emergency hospital throughout the epidemic, relieving a temporary interne, kindly placed at the services of the local authorities by the Seattle Emergency Hospital.

This assistance so courteously extended to the local authorities by the state military authorities was of great service and was the only financial assistance received from any outside source.

To the emergency hospital only those were admitted who could not have proper nursing and isolation elsewhere. All who entered the hospital were seriously, most of them dangerously, ill. Each patient remained under the charge of the attending physician recommending admission, supplemented by the constant supervision of the militia surgeon. Ample nursing care was provided for all patients admitted, the nursing staff being organized, and nursing, drug, diet, kitchen and general equipment being installed under the direct supervision of a lady residing in the city who had fortunately had previous experience as a nursing executive in emergency hospitals.

Through the courtesy of the local Commercial Club the secretary of that organization assumed and ably discharged the duties of business management of the emergency hospital throughout.

A Citizens' Volunteer Committee raised several hundred dollars for the purpose of supplying "extras" as special nurse care, additional comforts and delicacies for convalescents at hospital, etc.

The hospital was in use forty-five days. In all seventy patients were admitted, the average length of stay being twenty days. The total number of fatalities in the hospital were two. When the very grave nature of the illness of the average case admitted is taken into consideration the mortality record is very satisfactory.

COST OF THE EPIDEMIC.

To attempt to place a monetary estimate upon the loss produced by an epidemic is, in many respects, a superfluous task. No one will deny that the human loss that can never be reduced to dollars and cents outweighs all other considerations in calamities of this type. Nevertheless, the following figures may be of interest:

1. Direct Expenditures due to Epidemic.

State Board of Health general fund (about)	\$500.00
City of Centralia	726.85
Lewis County	4,515.22
State Militia Fund	1,457.35
Total	\$7,199.42

2. Estimate of Indirect Loss.

The statutes of several states place a monetary value on an individual life if killed by accident at \$5,000. Several eminent authorities have agreed in fixing the figure of \$100.00 as the minimum direct cost through loss of wages, sickness expense, etc., for the average case of typhoid at all ages. This figure is probably erroneous on the side of under-estimation for a community on the Pacific Coast. But accepting these two estimates, the indirect cost of lives sacrificed and sickness to the individual families in this outbreak is as follows:

24 lives at \$5,000 each	\$120,000.00
326 cases of illness at \$100 each	32,600.00
Total	\$152,600.00

In addition there is a heavy although undeterminable loss to any community from a typhoid epidemic, resulting from loss of trade, temporary depreciation of property, demoralization of local industries, etc.

Typhoid Fever Epidemic—Centralia, Washington 1045

CONCLUSIONS.

Certain striking features present themselves in relation to this epidemic which are sufficiently out of the ordinary to warrant calling particular attention to them. They are:

(a) Coincidence of practically complete cessation of new cases at the end of average incubation period, following the installation of the hypochlorite plant.

(b) Extent of vaccination proportionate to the total population and certain failures and complications of vaccination.

(c) Efficiency of the Emergency Hospital care and low Emergency Hospital mortality.

(d) The small number of secondary cases.

(e) The resulting sanitary improvement in the town.

And the general conclusion of the whole matter—the heavy price paid for the continued use of a known polluted water as a municipal supply without any purification or sterilization. In Centralia's case this apparent failure of municipal responsibility is possibly more excusable than in many similar instances, because the city had only obtained ownership of the water supply from a private corporation four months prior to the outbreak, and before the epidemic occurred had let the contract for the construction of pipe lines to an uncontaminated source twenty-five miles higher up on another stream, in uninhabited foothills lying within a patrolled Federal Forest Reserve.

REVIEW OF FORMALDEHYDE FUMIGATION.

WM. DREYFUS,
New York City.

Read before the Laboratory Section, American Public Health Association, Colorado Springs,
September, 1913.

It is just about four years since I had the pleasure of reading a paper before this Section, on the Importance of Standard Methods for Testing Disinfectants, which resulted in the appointment of a Standardization Committee by the Council of this Association, the work of which has borne, as you all well know, such excellent fruits.

In taking a bird's-eye view of the various methods used in this country as well as abroad for room disinfection by means of formaldehyde, as a preventive or after cases of communicable diseases, the situation reveals conditions almost as chaotic as those of the testing of disinfectants did in 1909. Many investigators, however, have sounded the note of warning years ago, particularly Rickards, in a paper read before the Section of Medical Health Office, in 1908 and Holm and Gardner, in an article published in the *Journal of Infectious Diseases*, 1910. It is not within the scope of this paper to enter into the merits of formaldehyde disinfection in general or to discuss after which diseases it should be practiced, but there is no doubt that the lack of uniform methods of application under fixed conditions is responsible in a very great measure for the discredit into which disinfection has fallen with a large percentage of professional men.

The chemical and physical characteristics qualify formaldehyde as the most suitable agent today for disinfecting rooms and objects contained therein and a number of thoroughly scientific experiments as well as actual experience in practice prove that most reliable results can be obtained.

The respective literature on the subject offers an enormous field of suggestions, concerning methods and apparatus for room disinfection by means of formaldehyde and considering the great importance of the question, it may be of interest to review briefly the most common ones.

1. GENERATION OF FORMALDEHYDE GAS BY OXYDATION OF METHYL ALCOHOL.

This is probably the oldest method of production and consists of passing methyl alcohol vapor over heated platinum black or platinized asbestos by means of suitable contrivances. Their number counts legion and although they do not interest us from a large scale viewpoint on account of economy and efficiency, they still enjoy considerable application in homes, offices, etc., for deodorizing purposes and for medicinal uses to disseminate essen-

tial oils, menthol, thymol, etc. The chemical process of these lamps still forms the basis for the process of manufacture of formalin commercially today.

2. GENERATION OF FORMALDEHYDE GAS-WATER VAPOR MIXTURES BY MEANS OF APPARATUS.

This method is based on the principle of vaporizing the gas from an aqueous solution by means of external heat. The oldest representative type is the Trillat autoclave which, however, has almost gone out of use. In this country a certain type of regenerators still enjoys a great reputation on account of its efficiency, simplicity, economy, and safety from explosion. The formaldehyde solution drops by means of a needle-valve into a heated concave copper chamber, where it is immediately broken up into formaldehyde gas and water-vapor. It is well known that if formaldehyde solution passes over a surface heated above the degree of Depolymerization, say to about 200° C in a slow, steady stream, absolutely no polymerization can take place. In Germany the so-called "Glykoformalmethode" where glycerine is added to the formaldehyde solution, and other similar methods have been considerably used. The object seems to be to produce a spray or mist whereby a more uniform distribution of formaldehyde and water vapor is obtained in the space. The best of these apparatus have the great advantage that the yield of formaldehyde gas is very high and that they can be operated from the outside of the room to be disinfected and their action thereby controlled.

3. FORMALIN SHEET SPRAYING METHOD.

This method is based on the evaporation of a formalin solution from a sheet saturated with same. From a chemical standpoint I should doubt if this is a very economical mode of application, in as much as formalin by slow evaporation will polymerize a large percentage of formaldehyde into paraform.

4. GENERATION OF FORMALDEHYDE GAS AND WATER VAPOR MIXTURES WITHOUT SPECIAL APPARATUS.

The main characteristics of this method consists in the fact that no direct fuel supply is necessary to produce formaldehyde gas and water vapor, but the heat is supplied by chemical reaction between the formaldehyde solution and the other reagent, which is generally an oxydizer. The best known of them all is the formalin-permanganate method which is too well known to require further description except that various experimenters have adopted different proportions of permanganate and formalin in view of obtaining the highest percentage of gas. Evans recommends practically 4 to 10. Base and McClintic of the Hygienic Laboratory 5 to 10, The Bureau of Animal Industry 8 to 10, Hill & Roberts, Minnesota State Board of Health Laboratories, 7 to 10 per 1000 cubic feet. A prominent municipal Health officer told me about a year ago that he found the formaldehyde

permanganate method to give, even in dosage of 16 ounces of formaldehyde and 8 ounces of permanganate per thousand cubic feet, very unsatisfactory results, and that furthermore, the inspectors refused to use that method, complaining that their health is being affected through their fumigation work, because the reaction is so quick after sealing that they cannot leave the room quick enough and the formaldehyde vapors which they are compelled to inhale are very detrimental to their general well-being in the long run. He says they are compelled to consider the comfort of the inspectors and I thought it was a very important factor. Even from an economical viewpoint, this Municipal Health Officer assures me that although the formaldehyde-permanganate is cheap in cost of material, the process of disinfection by that method is more expensive, because they have to use a very large pail in which they place the ingredients, and the inspector has to call back for that pail after the premises are opened up, or abandon same, which in either case is a waste of labor and therefore an increased cost over the use of solidified preparations. Home and Gardner, in their very able investigation referred to at the beginning of the paper, prove that the lower the ratio between formaldehyde and permanganate the higher the loss in available formaldehyde gas and in order to insure abundance of moisture a permanganate diluted formalin can be used to great advantage, one of the best formulas being that of Hill and Roberts, namely:

Formaldehyde	11	parts by volume
Permanganate	11	“ “ weight
Water	9	“ “ volume

Abroad, various investigators have experimented to replace permanganate with other oxydizing agents, such as barium, or strontiumperoxide, hypochlorides, etc., using paraform instead of formalin or formaldehyde source but they show less efficient and about doubly more expensive. More satisfactory results, however, were obtained by replacing a small percentage of permanganate with another oxydizer and the greatest hope for improvement over the present method comes from this quarter.

In spite of the great advantages in efficiency and simplicity, the question of economy and the discomfort and harm caused to those who have to work with it regularly, prevent to secure to the permanganate-formalin method the popularity it would otherwise deserve or enjoy.

There is still another group of Formaldehyde generators to be mentioned, the so-called commercial fumigators, which produce their gas either from solidified formaldehyde or by vaporizing paraform in various ways. Most of the manufacturers, however, fail to state the proper quantity required per 1,000 cubic feet and in most cases where statements are made they are exaggerated and unreliable, otherwise these so-called candles would enjoy great popularity on account of their simplicity. Holm says: "It is a curious

fact that the various proprietary manufacturers have in their possession testimonials and recommendations from numerous bacteriologists showing the efficiency of their products, and many of these bacteriologists are peculiarly men of national or international reputation. But the methods of investigation and the nature of the culture as well as the conditions of exposure vary so enormously that such testimonials are practically worthless. I know of a case where a prominent board of health using one of the best known brands is compelled to use the candle in four times the strength recommended by the manufacturer on the label."

Another point which needs mention is the want of accuracy in control tests which is most ably discussed by Dr. Hüne in "Desinfektion," Volumn 4, No. 1.

Rickards, after collecting his statistical information regarding disinfection as carried on in the larger cities of the United States, says: "The present situation is intolerable viewed from a scientific standpoint. If disinfection is of value in any case then it should be done in an efficient manner; a manner proved by exhaustive work to be reliable. If disinfection in general is not of value and can be proved to be of little or no value in any given disease, then disinfection in that case should be abandoned and trouble and expense thus saved."

When we consider these words, I think it is high time for this Section to take up this important question officially by asking the Council to appoint a standardization committee to investigate formaldehyde room disinfection.

UPON THE DETERMINATION OF MINUTE QUANTITIES OF NITRATES, PARTICULARLY IN POTABLE WATERS.

AUGUSTUS H. GILL,

Massachusetts Institute of Technology, Boston.

Read before the Laboratory Section of the American Public Health Association, Colorado Springs, September, 1913.

In a study of the determination of this substance made twenty years ago, the opinion was stated that advancement in its estimation was to be "sought not in the reduction to ammonia but in the formation of nitro bodies of high coloring power and constant composition."* The method there recommended consisted, as has been shown later,† in the formation of ammonium nitrophenol disulphonate from the reagent phenol disulphonic acid (1, 2, 4) and the estimation of the depth of the color. This will detect 0.001 part of nitrogen as nitric acid in 100,000, or one part in one hundred million. While engaged in this work, it occurred to the writer to compare the strengths of ammoniacal solutions of Martius' yellow (dinitro *a* naphthol 1, 2, 4) and picric acid (trinitrophenol) which was supposed at that time to be the colored compound formed, each of the same nitrogen contents,—approximately 10 mgs. of it in 500 cubic centimeters; it was found that the former was ten to twelve times as deep in color as the picrate. Consequently, the formation of this body should enable us to obtain the next place or one part in one billion and afford the same delicacy to the nitrate as to the nitrite and ammonia tests.

It became a question of preparing *a* naphthol disulphonic acid $\text{OH} : \text{SO}_3 : \text{SO}_3 :: 1 : 2 : 4$, which was stable and of sufficient purity as to yield a blank. Preliminary experiments were made with pure *a* naphthol and sulphuric acid, the colors obtained with the nitrates were deep—and so were the blanks. The naphthol was then distilled four times in an atmosphere of carbon dioxide—for it seemed to turn brown by oxidation—yielding a beautiful snow white product: the sulphuric acid was the purest obtainable the so-called "Kjeldahl acid," carefully redistilled in the laboratory. Upon heating together 8 grams of the naphthol with 150 grams of the 93 per cent. acid at 50° for three hours an acid was obtained which in an 8 per cent. solution in sulphuric acid gave a good color with .002 parts per million. This, on standing twenty-four hours, lost its power, and all acids made with a weak sulphuric acid showed the same defect and also an inferiority of color. The acids so prepared had the advantage of being practically colorless,

* J. Am. Chem. Soc., 16, 122 and 197 (1894).

† Chamot, and Pratt, id. 31, 922, and 32, 630.

which was not the case with those obtained with the strong acid. These were probably mixtures of 1, 2, and 1.4 mono sulphonic acids.

An acid was next prepared by warming the naphthol with double its weight of strong sulphuric acid and when solution was complete adding its weight of distilled fuming acid making a 25 per cent. mixture of naphthol in fuming sulphuric acid, the sulphonic acid not being completely soluble. This gave a distinct yellow with .001 part of N per million but the blank had a faint greenish tinge; similar results were obtained with a solution half as strong. While this solution would seem sufficiently delicate yet it is deficient in keeping power.

The lead and calcium salts were prepared from the latter acid, washed with water free from ammonia until a blank was obtained and the acid freed by sulphuric acid; this solution gave a distinct color with .001 part of it and a blank; in a week's time, however, blanks could not be obtained.

The barium salt was next tried: the *a* naphthol was distilled four times in a stream of carbonic acid and treated with five times its weight of carefully redistilled sulphuric acid containing 20 per cent. anhydride, for two hours on the water bath. It was next neutralized with barium carbonate, the air expelled from the solution with carbonic acid and allowed to stand. The barium *a* naphthol disulphonate formed was washed with water and recrystallized from water free from ammonia.

Portions as large as three pin heads were put into the dish containing the nitrate residues and rubbed up with the purest sulphuric acid. A good yellow was obtained with .001 part per million. The reagent, however, in a week's time became inactive.

Similar results were obtained by the use of a purified disulphonate made from that commercially obtainable. This same was found to be true of the acid made according to the procedure of Conrad and Fischer, *Annalen* 273, 105 (1893)—the *a* naphthol disulphonic acid 1, 2, 4.

There will be no difficulty in estimating nitrates in potable waters to one part in one billion if a suitable and permanent naphthol sulphonic acid can be obtained.

The writer wishes to express his obligation to Messrs. Weston, Pugh, Tufts, Newton and Miss Thomson by whom the experimental work has been performed.

THE INHIBITING ACTION OF A COLORED WELL WATER ON BACTERIA AND A STUDY OF THE INHIBITING EFFECT OF SOME INORGANIC SALTS.

E. J. TULLY,

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Read before the Laboratory Section, American Public Health Association, Colorado Springs,
September, 1913.

Occasionally, in connection with the regular routine work of the laboratory, samples of well waters have been received which proved to be practically sterile when subjected to a bacteriological examination, and, therefore, apparently of satisfactory quality, but from a chemical viewpoint some of these waters did not appear to be entirely acceptable. The results of analysis in one particular case indicated the presence of relatively large amounts of nitrogenous organic material, and comparatively a very large amount of iron. A considerable quantity of the iron was in solution and the turbidity was mainly due to iron. It was thought that some interesting results might be obtained by subjecting different bacteria to the action of this water, and at the suggestion of Dr. M. P. Ravenel, director of the state laboratory of hygiene, the experimental work was extended to include a few pathogenic organisms.

In order to eliminate the few organisms found in relatively large quantities of the water (5 cc.), a large sample was placed in a sterile Erlenmeyer flask, plugged with cotton, and slowly brought up to a temperature of 80° C. After a few minutes' exposure to this temperature the flask was allowed to cool at room temperature; and, when cool, 100 cc. samples were measured with a sterile graduate and placed in sterile Erlenmeyer flasks having a capacity of 150 cc. The water was heated to 80° rather than sterilized under pressure in order to prevent the precipitation of bicarbonates and iron, and thus ensure the original salinity of the water.

The organisms selected were *B. coli*, *B. typhi*, *B. disenteriae*, a streptococcus, a staphylococcus pyogenes aureus, *B. cholerae suis*, *B. diphtheriae*, *B. pyocyaneus*, *B. prodigiosus* and *B. lactis aerogenes*; and, after pure cultures had been obtained on lactose agar, suspensions of these organisms in sterile distilled water were made. The distilled water was obtained by distilling lake water acidified with concentrated sulphuric acid in glass stills and was entirely free from salts and organic material. Each one of the sterile 100 cc. samples of the well water was inoculated with one of the organisms and, after the flasks were well shaken, the bacterial content of each one, with

the exception of the flask containing *B. diphtheria*, was determined by plating a dilution of 1 cc. of the sample in agar, and incubating the plates at 37.5° C. The bacterial content of the flask containing the diphtheria bacilli was determined approximately by comparing its turbidity with the other suspensions. A series of controls were also made by inoculating flasks containing 100 cc. of sterile distilled water, to which had been added a small quantity of inorganic salts necessary for growth, with one cubic centimeter of a suspension of the respective organisms.

The flasks were kept at room temperature for twenty-four hours, when the bacterial content of each was determined by plating one cubic centimeter in lactose agar, and after an incubation period of twenty-four hours at body temperature the plates were counted. The viability of the diphtheria

TABLE I.

EFFECT OF WELL WATER ON LONGEVITY OF ORGANISMS EXPOSED FOR TWENTY-FOUR HOURS AT 20° C.

Number of organisms present in 1 cc.

Samples.	Organisms exposed to well water.					
	<i>B. coli.</i>	<i>B. typhi.</i>	<i>B. dysent.</i>	Staphylococcus.	Streptococcus.	<i>B. diphtheriae.</i>
Initial number of organisms present in 1 cc. of inoculated well water. .	58,000	120,000	1,000,000	6,520,000	6,500,000	6,500,000 (approx.)
Number of organisms present in 1 cc. of well water after 24 hours. . .	4,900	700	2,120	9,740	15,250	0
Number of organisms present in 1 cc. of controls after 24 hours' exposure.	47,000	31,000	671,000	502,000	415,000	+

+ = present.

organisms was determined by centrifugating 10 cc. of the sample in sterile tubes and smearing the sediment on blood serum slants by means of a sterile platinum loop. The slants were incubated at 37.5° C. In the case of the control, growth resulted, and a portion of the growth appearing on the blood serum after an incubation period of twenty-four hours at 37.5° C. was smeared on a glass slide, stained with methylene blue and examined microscopically for the purpose of confirming the growth on blood serum, which appeared typical; the organisms showed microscopically all the morphological characteristics of *B. diphtheriae*. The effect of this twenty-

four hour period of exposure of the organisms to the water was quite interesting. The results indicate that a material reduction in the number of organisms present in each flask took place during this period, and show that some of the bacteria possessed a relatively higher power of resistance to the toxic influence of the well water than others. The results of the test after one day's expose of the organisms to the water are given in Table I.

TABLE II.

EFFECT OF WELL WATER ON LONGEVITY OF ORGANISMS EXPOSED FOR TWENTY-FOUR HOURS AT 20° C.

Samples.	Organisms exposed to well water.					
	B. coli.	B. typhi.	B. dysent.	Staphylococcus.	Streptococcus.	B. diphtheriæ.
	Number present in 1 cc. after 48 hours.					
Initial number of organisms present in 1 cc. . . .	58,000	120,000	1,000,000	6,520,000	6,500,000	6,000,000 (approx.)
Number present in 1 cc. after 24 hours' exposure at 20° C.	671	64	199	850	1,360	0
Number present in 1 cc. of contents after 24 hours' exposure at 20° C.	96,000	5,000	486,000	750,000	1,310,000	
	Number present in 1 cc. after 72 hours.					
Initial number of organisms present in 1 cc. . .	58,000	120,000	100,000	6,520,000	6,500,000	6,000,000 (approx.)
Number present in 1 cc. after 24 hours' exposure at 20° C.	81	0	28	166	190	0
Number present in 1 cc. of contents after 24 hours' exposure at 20° C.	50,000	1,040	670,000	570,000	900,000	

The decline in the number of organisms in each flask during the day was quite marked. In order to note the relative rate of decline of the different bacteria over a longer period, the flasks were again incubated at 20° C., and after forty-eight and seventy-two hours' exposures respectively, quantitative determinations of the numbers of the respective organisms were made. The same procedures mentioned above in regard to plating and cultivation were followed each time. The results are tabulated in Table II.

These results indicate quite conclusively that the inhibiting action was due to the material present in the water. It appears that the toxic action of the water was sufficient to destroy most of the organisms present in the flasks in three days; and, as the quantity of ferruginous material present in the water was quite large, the presumption was that the marked diminution was probably due to the inhibiting influence of the iron.

Having determined the effect of the sterile well water on the longevity of the different organisms in pure cultures, attention was next directed to the question of the influence of some of the common inorganic salts in different concentrations on the viability of the respective organisms. For the purpose of ascertaining the relative efficiencies of the elements and radicles as inhibiting or antiseptic agents and, also, in order to determine the correctness of the supposition that the iron had something to do with inhibiting the growth of the organisms in the well water, magnesium sulphate, sodium sulphate, calcium chloride, magnesium chloride, ferrous sulphate, ferric chloride, and potassium nitrate were selected and comparatively weak and concentrated solutions of each salt were made for the experimental work.

The solutions of the salts were made in sterile distilled (in glass) water and varied in concentration from 10 per cent. to .005 per cent.; and to each series of flasks containing one of the salts one cubic centimeter of a suspension of the respective organisms in sterile distilled (in glass) water was added.

After an exposure of the respective organisms to the salts for twenty-four hours, quantitative determinations were made by plating one cubic centimeter of the inoculated salt solutions in lactose agar and incubating at 37.5° C. for one day. In Table III the effect on the organisms of the salts in relatively concentrated and weak solutions are shown.

It would appear from these tests, in which various chemical solutions of a different nature were employed for the purpose of determining the action of the radicles, that the sulphate, chlorine and nitrate radicles and the elements, even in comparatively concentrated solutions, with the exception of iron, have relatively but little inhibiting action. The results, however, indicate that iron exerted to a certain extent a detrimental influence on the viability of the organisms.

A comparison of the results tabulated in Tables I, II and III, would appear to confirm the supposition that the high iron content of the water was influential in maintaining the low bacterial content.

Incidentally, this particular case exemplifies the desirability of making a sanitary chemical as well as a bacteriological examination of a sample of water. The bacteriological data in this particular instance, while indicating that the water was safe, in so far as low bacterial counts may be regarded as satisfactory evidence of good quality, do not afford any infor-

mation whatsoever in regard to the antecedent history of the water. The sanitary chemical analysis, however, gave desirable information in regard to the general quality of the water and the character of the soil from which

TABLE III.

THE EFFECT OF DIFFERENT CONCENTRATIONS OF THE INORGANIC SALTS ON SOME ORGANISMS.

Samples.	Organisms exposed to salt solutions.					
	B. coli.	B. typhi.	B. dysent.	B. lac. ærog.	Strepto- coccus.	Staphylo- coccus.
Initial number of organisms present in 1 cc. of salt solution.....	300,000	280,000	30,000	50,000	960,000	30,000
Number of organisms present in 1 cc. after 24 hours.....	310,000	90,000	21,200	42,000	600,000	36,000
Sols. of Salts.	Number of Organisms present in 1 cc. after 24 hours' exposure.					
MgSO ₄ 10. %	50,000	40,000	9,000	1,500	180,000	15,000
0.01 %	240,000	71,000	28,000	37,000	410,000	40,000
Na ₂ SO ₄ 10. %	70,000	55,000	10,100	11,000	210,000	8,000
0.01 %	205,000	86,000	18,000	65,000	715,000	40,000
KNO ₃ 10. %	72,000	3,600	5,100	12,500	50,000	300
0.01 %	184,000	47,500	27,000	75,000	411,000	46,000
MgCl ₂ 10. %	1,500	9,000	8,000	2,000	150,000	12,000
0.01 %	140,000	65,000	17,800	50,000	480,000	80,000
CaCl ₂ 10. %	0	0	0	0	1,200	150
0.01 %	78,000	16,000	11,000	33,000	302,000	20,700
FeSO ₄ 0.01 %	33	0	0	60	58	88
0.005 %	140	2	18	270	360	304
FeCl ₃ 0.01 %	18	0	0	29	61	108
0.005 %	97	1	20	215	200	275
FeSO ₄ ± Na ₂ CO ₃ (a) 0.005 %	270	6	35	270	266	410
FeCl ₃ ± Na ₂ CO ₃ (a) 0.005 %	194	4	27	310	260	380

(a) Theoretical amount of Na₂CO₃ to combine with sulphate and chlorine radicles respectively.

the water was derived or through which it passed: the results of the chemical determinations indicated that the water could not be regarded as entirely acceptable, although the bacteriological data indicated a satisfactory supply.

THE REFERENDUM FOR THE WINNEBAGO COUNTY TUBERCULOSIS HOSPITAL.

OTTO F. BRADLEY.

Read before the Sociological Section, American Public Health Association, Colorado Springs, September, 1913.

Any measure entailing a substantial expenditure of public funds has but a meagre chance of carrying when referred to a vote of the people. If the referendum happens to be in a rural community, where opposing taxation, the farmer's greatest bugbear, is almost a religion, even the small chance is eliminated. Its defeat is almost a certainty.

It was, therefore, unusual that the voters in a Wisconsin County, with a population one-third rural, recently voted an appropriation for a tuberculosis sanatorium by a large majority. The campaign responsible for this action should interest those concerned with public education.

To be complete the story of this campaign would have to go back to the first organized public health education in Wisconsin. It would describe the program of lectures, literature, exhibits and education through the newspapers; work with the general public and in the schools; and special campaigns for the cities and the rural sections; all of which have been a part of the comprehensive scheme of the Wisconsin Anti-Tuberculosis Association for securing general popular enlightenment on this subject. The increased understanding along these lines has not only resulted in better private living conditions, but has made possible the introduction of special projects dependent upon public support.

An account of the pioneer educational work throughout the entire state, as well as in Winnebago County, belongs to the story of this project. It was only made possible by state subvention, which aid was secured by state-wide effort. The state pays \$5 per week per indigent patient to county sanatoria in Wisconsin. The writer will only attempt, however, to outline briefly the recent county campaign.

The question of an appropriation for a sanatorium had to first be presented to the county board of supervisors. A general campaign was made, including public talks and the distributing of special literature throughout the county. The purpose of this was primarily to discourage the claim that the taxpayers would not favor it. In addition to the general work, a lobbyist from the Wisconsin Anti-Tuberculosis Association called on each member of the board personally. The result was an appropriation of \$30,000 for the establishment of an institution, carried by a majority of but one vote.

Though it was afterward stated that several of the unfavorable votes resulted from a misunderstanding regarding the possibilities of securing a proper site, there was a strong sentiment, largely on the part of rural members, against making the appropriation.

Backed up by the ostensible fairness of their proposition that, since the sentiment of the board was so evenly divided and there was a difference of opinion as to the wishes of the majority of the taxpayers, it would be only fair to let the people decide the matter, the leaders of the opposition circulated petitions which were signed by the necessary 20 per cent. of the voters, putting the measure to a referendum vote.

Though the popular educational work had been fairly thorough, it was doubtful whether the majority of the taxpayers were in favor of an appropriation. The matter was to come up at a spring election, when there would be a very light vote in the cities and a heavy vote in the country. It, therefore, seemed certain that, unless something effective could be done, the sanatorium project was doomed.

For a long time county board members had shifted the responsibility of opposing appropriations to the alleged wishes of their constituents. It would be disastrous in other counties to have an example of the people declaring against such an appropriation. The establishment of more than one institution was, therefore, at stake. Appreciating the importance of this election, a campaign was planned, with many doubts, but with more determination, which resulted in the decisive victory for the sanatorium.

It was generally felt that the people would not uphold the appropriation and the opposition did not feel it necessary to make a systematic campaign. In order to avoid arousing them to activity, nothing was done openly in behalf of the sanatorium until four days before election. The newspapers published stories from time to time of cases which illustrated the need of segregation, but the impression was never given out that a campaign was being waged.

An organization for getting out the stay-at-home voters in the cities was quietly effected and individual work was carried on in the different wards, however. The Trades and Labor Council of Oshkosh, the largest city in the county, made a discussion of this issue part of the regular order of business for every labor union at each meeting until election. A well-informed speaker was always present to direct the discussion along the right lines. Similar work was done among the unions in Neenah and Menasha, and letters were sent to practically all of the organizations in the county soliciting their support.

Four days before election, a sensational campaign was launched. All effort was directed toward bringing out the vote in the cities. The Metropolitan Life Insurance Company sent circulars to their 6,000 policy holders and over 2,000 other circulars were personally distributed in the

mills at Neenah and Menasha. The night before election, the boy scouts distributed 5,000 hand bills which they furnished themselves. In addition to the appeal to the voters, these dodgers stated that they were paid for and circulated by the boy scouts in the interest of humanity.

Much good work was done through the schools. By order of the county superintendent, the question was debated in all the schools through the county. Those wanting a sanatorium had confidence that it would profit by any fair discussion. When the debate was announced the children were given as much information as possible which they took home with them along with their questions, which at least aroused an inquiring interest on the part of the parents.

The Sunday before election "Sanatorium Sunday" was observed by the churches. Members of the various congregations were urged, not only to vote, but to join in the effort to get all the voters to go to the polls and cast their ballot for the sanatorium. The newspapers gave much space, publishing stories of the campaign. A resolution, signed by all of the election candidates, as well as proclamations from the mayors of Neenah and Menasha, was given broad publicity.

The result was a majority of 1,261 votes, or about three to two. The results of the general work that had been done in the rural sections previous to the special campaign were evident, but the majority of the votes cast in the country districts were against the appropriation. They were more than offset, however, by the large majority obtained in the three cities. The unusually large vote polled at this off year spring election was the subject of newspaper comment, which attributed it to the interest in the sanatorium issue.

A committee has been appointed which has prepared plans and, although there is a temporary delay on account of the site, they are pushing the sanatorium to completion as rapidly as possible. The leader of the opposition, who started the referendum, was made a member of the special committee. It is interesting to note that he is now one of the most enthusiastic pushers of the sanatorium in Winnebago County. The referendum convinced him that the majority wanted it and he quit opposing the appropriation. Later, when, as a member of the committee, he visited other institutions, he became enthusiastically in favor of it. After going through the Milwaukee institutions he declared his intention of returning home and starting, on his own accord, an educational campaign to popularize the sanatorium in the country districts.

CREATING A MUNICIPAL TUBERCULOSIS SANITARIUM BY REFERENDUM.

FRANK E. WING,

General Superintendent, Chicago Municipal Tuberculosis Sanitarium.

Read before the Sociological Section, American Public Health Association, Colorado Springs,
September, 1913.

In March, 1909, the directors of the Chicago Tuberculosis Institute found themselves in a position to create an institutional provision for consumptives in Chicago through the enactment by the state legislature of what is known as the Illinois "Public Tuberculosis Sanitarium Law," an enabling act permitting cities and villages to establish and maintain tuberculosis sanitariums. The law becomes effective in cities and villages after a successful local referendum vote, and provides that the city council or board of trustees of such city or village, as the case may be, shall annually thereafter levy a special tax of not to exceed one mill on every dollar of assessed valuation for the construction and maintenance of said institution. A majority of those voting on the proposition is sufficient to carry the measure at a local referendum.

A one-mill levy in Chicago at the 1910 valuation would be \$856,000. Such was the yearly amount which the Chicago electorate had within their power to authorize for the relief of 15,000 consumptives in need of institutional care, a dramatic background to the arena on which the fight for votes was to be waged.

The reasons for carrying on an extensive campaign were two:

First: Because the situation demanded not merely a favorable vote, however small, on the proposition, but such a big vote that there could be no doubt in the minds of the City Council, who were to levy the tax, as to where the people of Chicago stood in the matter of public care of the consumptive.

Second: The campaign offered an excellent opportunity for educational work.

With only a month intervening in which to make the fight, the board of directors of the institute at an early meeting formulated a comprehensive plan of campaign. This plan was carried out almost to the letter.

The campaign naturally divided itself into two important lines of activity—"endorsement" and "publicity."

Endorsement. In order to carry weight at the polls, it was recognized that a measure of this kind would require very wide endorsement. Efforts were at once directed to this end and with invariably good results. The commissioner of health and, as a natural consequence, all those connected

with the health department, became at once among the strongest and most influential supporters of the measure.

The vote was taken in connection with a regular aldermanic election, and as the measure was non-partisan in character, every aldermanic candidate of all parties, together with candidates for the office of city treasurer and city clerk, were asked to subscribe to it. The response was quite general.

The Chicago Federation of Labor passed resolutions of endorsement including a recommendation that each of the 200 delegates secure the endorsement of his respective local. Simultaneously with this action a letter was sent to the secretary of every local with a suggested form of resolution enclosed. These were acted on and returned by nearly forty locals.

In like manner philanthropic societies, settlements, civic bodies, fraternal organizations, women's clubs, the Chicago Medical Society and many other organizations not only endorsed the measure but sent letters to their members asking for votes.

Publicity. Of more practical importance than endorsement was publicity. In this the methods of the press agent and the advertising man were brought successfully into play. The Chicago newspapers supported the measure as a unit. During the entire campaign not a single news item or editorial appeared against the proposition, while many of the big Chicago dailies lent the full strength of their editorial and news columns to its support. One paper gave numerous signed articles by prominent physicians, together with a most effective cartoon on the day before election. The *Bulletin of the Chicago Medical Society* printed a letter signed by the president and members of the executive committee of the Tuberculosis Institute. In one issue the *Union Labor Advocate* gave ten full pages with illustrations; the Jewish papers gave editorials; the Italian papers used a letter signed by six prominent Italian physicians. Just before election bulletins were sent to the German, Swedish, Bohemian and Polish papers, and were used by them. Clippings actually gathered from the Chicago papers during the month's campaign measured 1,867 inches, or 155½ feet of column space. In addition to this, the *Bulletin of the Chicago Health Department* devoted practically all of its space for three weeks in support of the measure.

Another form of publicity was secured through public meetings. Speakers were provided by the institute at all of these meetings, including a large Jewish mass meeting, meetings before church clubs, civic bodies, and campaign meetings of all parties in the various wards.

Further publicity was secured by means of large two color "Mr. Voter" posters, as they were called. These were printed in different languages and distributed in every precinct as well as in the downtown district.

In addition to this, one hundred thousand four-page "Mr. Voter" folders

were printed, bearing on the front a duplicate of the poster, and on the inside pages the essential features of the law; also the results of treatment at the Edward Sanatorium at Naperville, proving conclusively that consumptives can be cured in Illinois, and on the back page a group photograph showing patients under treatment at Naperville, one of whom had gained twenty-seven pounds in seven months, asking the question, "Does this group suggest a failure?" and following with the further suggestion in color, "The Tuberculosis Sanitarium Law Has Opened the Door of Hope to Every Wage-earner in Illinois."

These were distributed in every way possible that would insure their going home to the voter—in employees' pay envelopes, by 600 agents of the Metropolitan Insurance Company, who distributed 40,000 folders, in aldermanic campaign literature, at settlements, clubs, etc., and by individuals.

Then the church was brought into the campaign. Speakers were sent to the down-town ministers' meetings of the various denominations. Six hundred letters, containing suggestions for an insert in the church calendar on the Sunday before election, were sent to as many ministers and special mention was made of the proposition from scores of pulpits.

The final stroke in the campaign was the mailing of ten thousand letters with the "Mr. Voter" folder enclosed—one to each of the five judges and clerks of election in 1,360 precincts, and one to each precinct committee man of both parties, asking them to vote "yes" on the measure and to use their influence in persuading others to do the same.

And with what result? There was some silent but no open opposition, presumably on the part of small property owners who would object to any measure involving a slight increase in taxation. When the returns were counted, it was found that the vote stood 167,000 "for" and 39,000 "against" the proposition. Five out of every six who voted the regular ballot, voted also on the special ballot; and four out of every five who cast the special ballot did so in favor of the measure. Such an overwhelming majority could not fail to have the desired effect on the city council when it became necessary to levy the first tax.

Subsequent events. Such are the details of the campaign which resulted in the creation of the Chicago Municipal Tuberculosis Sanitarium, thereby making possible an annual additional revenue of nearly one million dollars for a single phase of public health work. The remainder of this paper will outline briefly the steps which have been taken to carry the referendum decision into effect.

Within two weeks the mayor appointed a board of directors,* consisting

* Dr. Evans was succeeded by Dr. George B. Young, Health Commissioner, in May, 1911; and Mr. Higinbotham was succeeded by Mr. W. A. Wichboldt in May, 1913. The present officers of the board are Dr. Theodore B. Sachs, president, and Dr. George B. Young, secretary.

of Mr. Harlow N. Higinbotham, Dr. Theodore B. Sachs, and Dr. William A. Evans, three men already long identified with the anti-tuberculosis movement in Chicago, thereby assuring a high standard of administration of the newly created institution.

In January, 1910, at the request of the board, the city council included in its tax-levying ordinance an appropriation of \$407,000 (one-half mill) for the purchase of land and beginning of construction, the same being available in 1911. The amounts available from subsequent levies have been \$268,857 (three tenths mill) and \$902,832 (one mill) for 1912 and 1913, respectively, while the amount available in 1914 (one mill) will be approximately \$907,200, in all about two and one half million dollars in four years.

By sale of anticipation tax warrants sufficient money was realized to begin work in September, 1910, and at that time the board took over the entire dispensary work of the Chicago Tuberculosis Institute to become the nucleus of a city-wide dispensary system, which now comprises ten free tuberculosis dispensaries, with a staff of forty-five dispensary physicians, thirty-four of whom are a part of the paid service, one bacteriologist, thirty-seven nurses and the necessary clerical force.

Early in 1911 a site containing 160 acres was purchased, and Dr. Theodore B. Sachs was delegated by the board of directors to have charge of the preparation of plans. This work has been carried on energetically with the result that ground was broken late in 1911 and since the early part of 1912 construction has proceeded rapidly. Twenty-five buildings are now nearly completed and with the completion in 1914 of the large infirmary building now under construction, the institution will be ready for opening. The initial capacity will be 600 patients with an administrative capacity for handling 950 patients, to which number the facilities of the institution will be increased as soon as funds will permit, thus completing the largest sanitarium ever undertaken by any municipality in America.

THE SEATTLE REFERENDUM APPROPRIATING \$125,000 FOR A MUNICIPAL SANITARIUM.

JOHN WEINZIRL, PH.D.,

Professor of Bacteriology, University of Washington, and Secretary of Washington Association for the Relief and Prevention of Tuberculosis.

Read before the Sociological Section, American Public Health Association, Colorado Springs, September, 1913.

The referendum is comparatively a new piece of legislative machinery in America and the instances of its use in obtaining appropriations for health work are so few and novel that it appears worth while to describe a campaign of this sort. The Seattle referendum, appropriating \$125,000 for a municipal sanitarium, received such a sweeping majority as to make the conditions surrounding the campaign worthy of record; and it also suggests the question whether this mode of obtaining funds for health work might not be more widely employed with advantage.

The Seattle referendum occurred March 5, 1912. It was one of seven propositions submitted and one of four appropriating money for municipal purposes. It was the seventh proposition submitted and friends in the council advised its postponement, believing that it could not carry along with what appeared to be an already excessive budget. The fact that this proposition carried by the largest majority and the lowest negative vote, not only of the seven propositions but also of the twenty-seven charter amendments submitted at the same time, renders it a notable victory for health work and one never to be forgotten among anti-tuberculosis workers. The vote in favor was 39,014, and against, 8,831, thus giving 81.5 per cent. of the votes cast in its favor. The only other vote which approached it in unanimity was on an insignificant charter amendment (No. 9), providing for yearly examinations of city accounts, with 35,333 for, and 7,145 against. In this connection it may be worth while to list the propositions submitted, together with the vote cast.

The vote on the several propositions is interesting from several points of view; in this connection, it is especially interesting because it shows the discrimination exercised by the voters. The citizens voted for the sanitarium because they believed it to be a good thing. At this election women voted for the first time in our city and this undoubtedly favored the sanitarium.

PROPOSITIONS SUBMITTED MARCH 5, 1912.

	Amount.	For.	Against.
1 For acquiring a municipal telephone	0	32,498	18,163
2 For adoption of Bogue plan for a civic center. .	0	14,406	24,966
3 For granting street railway extensions.	0	16,785	22,924
4 For parks and park development.	\$500,000	30,047	15,370
5 For purchase of Lake Cushman power site. . .	500,000	25,446	20,161
6 For purchase of White River power site.	1,000,000	27,067	17,223
7 For erection of municipal sanitarium.	125,000	39,014	8,831
8 Also eight harbor improvement propositions (By special port election held same day) . . .	8,100,000	Carried	

METHODS EMPLOYED TO BRING ISSUE BEFORE VOTERS.

A. *Immediate Means.* The immediate means employed to bring the issue to the attention of the voters were few. On January 20, 1912, the executive committee of the King County Anti-Tuberculosis league unanimously voted to request the city council to submit to the voters of Seattle a proposition to bond the city for \$125,000 for the purpose of erecting and maintaining a municipal sanitarium. They agreed to deed to the city, if the vote should carry, the site and property of the league, consisting of 34.4 acres, temporary structures and equipment accommodating, at the time, forty-two patients. The site was well located and conveniently situated on an interurban line just outside of the city limits. It was held at \$1,000 per acre by the owner. The other property had cost the league \$16,548.63.

The executive committee making this request of the council was composed of a remarkable group of men, viz., F. W. Baker, D. E. Frederick, A. S. Kerry, F. S. Stimson and J. F. Douglas, with H. C. Henry as president. These had been selected by Mr. Henry some months before from the most eminent and successful business men of the city, as his advisers in managing the sanitarium. This fact is here recorded as throwing an important light upon the question submitted. The request was backed by earnest men, matured in business experience and well known to the community. The confidence inspired by this committee would probably have been sufficient to carry the measure, but it was deemed advisable to employ some publicity measures.

Among the publicity measures was the securing of the coöperation of the city newspapers, all of which gave freely of their space and this no doubt commanded the attention of more voters than any other one factor. Another factor of immense value was the posters printed by the Pioneer Printing Company, and displayed by Foster and Klesier on their bill boards, both free of charge. Most novel among the measures was the work of the boy scouts, who on Saturday before the election distributed a manilla

card circular, $4\frac{1}{2}$ by 11 inches, at the door of every residence in Seattle; in most instances the circular was placed over the door-knob to insure its being seen. This circular gave the facts concerning tuberculosis in Seattle, and made a thrilling appeal to the voters. A return detachable post card requested contributions to the King County Sanitarium, the psychological inference being "if you do not vote for the bonds, you must help support the sanitarium." The result of the campaign was a surprise to the most sanguine.

It would not do to close this statement without giving the customary sworn statement of election expenses.

ELECTION EXPENSES.

For posting placards,	\$14.25
car tickets	1.31
hammer and tacks	.45
messenger service	2.15
polling list	.15
prizes to boy scouts	2.50
	<hr/>
	\$20.81

B. Remote Factors. To ascribe the success of this campaign to the immediate factors only would be committing a grave blunder and lead to an entirely mistaken view. Such a result is not obtained even in the far west without a considerable period of public education. To give an adequate idea of these remote factors would mean to give a complete history of the Anti-Tuberculosis League and other public health agencies. This is impossible except in merest outline and the reader is necessarily left to imagine the details.

The league was organized February 1, 1909, and in March Mr. William K. McKibbin was made executive secretary. Possessing a wide experience in ministerial, missionary and charitable work, he rendered the league most efficient services. A preliminary survey demonstrated the need for sanitarium accommodations for patients and for visiting and other nurses. A button-day campaign December 18, 1909, netted over \$6,000 and afforded most valuable advertising. This was a whirlwind campaign managed by Miss Bethesda I. Beals, the efficient executive secretary of our present State Anti-Tuberculosis Association. Through the generosity of Mr. Allen Dale, a cafeteria campaign, which included the same date, netted \$1,000. In June, 1910, a mammoth health exhibit accompanied by a program covering a whole week was held under the auspices of the state and city health departments and the league. This was an educational campaign and afforded most valuable publicity. A considerable number of paid member-

ships were secured by the league during the campaign. But the money thus obtained was only a fraction of what was needed in providing for sufferers. An appeal for aid was made to both the city council and the county commissioners. The county responded by a monthly contribution of \$333.33 and later the city gave a like amount. Yet with all the sources of income, it became apparent within the next year that even subsidized charity would be unable to carry the load but a short time. The necessity of the work had been established; the tremendous burden placed upon charity was equally plain; and the insufficiency of the public aid was pitiable. The result was the making of the appeal to the voters through the referendum provided by charter. The result of the appeal is now precious history.

There remains only a statement as to what is being done in carrying out the popular will. Suffice it to say that the city health commissioner, Dr. J. E. Crichton, was sent east to study institutions. Upon the ideas thus gained, plans and specifications were obtained and permanent buildings are now under construction. In the meantime the league had deeded over all its property to the city to be used for sanitarium purposes, and Mr. H. C. Henry is also erecting a \$25,000 administration building as a memorial to his son who succumbed to this awful plague. Thus this noble work is fairly provided for, and the burden rests upon the public where it properly belongs.

AN ACCOUNT OF THE REFERENDUM ON THE PROPOSITION TO ESTABLISH A TUBERCULOSIS HOSPITAL IN AND FOR THE COUNTY OF ST. LAWRENCE, NEW YORK STATE.

GEORGE J. NELBACH,

Assistant Secretary, New York State Charities Aid Association.

Read before the Sociological Section, American Public Health Association, Colorado Springs,
September, 1913.

In New York the county law authorizes the board of supervisors of each county to establish a tuberculosis hospital. There is no provision for a referendum in the law. In St. Lawrence County the board of supervisors, at its annual session in December, 1912, failed to vote affirmatively on the question, tabling, by a vote of twenty-two to eleven, a resolution committing the county to build a hospital, after two years' work.

Although it was pointed out that the law contained no provision for a referendum that would be binding upon the county, the board of supervisors passed a resolution to refer the hospital question to the people to be voted on at the spring town elections on February 11, 1913, and instructed its committee on public health to draft a uniform statement to be submitted to the electorate of each town. This committee, however, failed to report before the close of the session, and apparently it was not intended that the committee should report. Subsequently the supervisors of eight of the thirty-two towns in the county decided to obtain an informal expression of the opinion of their constituents at the spring elections.

St. Lawrence is the largest county territorially in New York, having an area of 2,880 square miles; the population is 89,005. It is also one of the most rural counties of the state, there being but one city, Ogdensburg (population, 15,933), and few large villages. Fully one fourth of the county lies within the Adirondack Mountain region. The county is located in the extreme northern part of the state and is bounded on the northwest by the St. Lawrence River and on the north by the Dominion of Canada. The winters are severe; railroads are all branch lines, and the train service, especially during the winter, is infrequent and unreliable. The people generally are conservative and slow to take up new ideas and enterprises. One frequently hears the county referred to as "rock-ribbed St. Lawrence," and as a "black Republican county."

A brief statement is given of the situation in each of the eight towns confronting those seeking to carry the referendum:

The Referendum in Establishing a Hospital 1069

Town of Canton. Population, 6,151, including the incorporated village of Canton with a population of 2,701. Two weekly newspapers: one favorable to the hospital; the other strongly opposed on ground of expense; published misleading articles and claimed that the Friedmann treatment made the provision of a hospital unnecessary. Active local tuberculosis society. Supervisor favorable to the hospital.

Town of De Kalb. Traversed across one corner by a railroad. Population, 2,516, rural. No incorporated villages. No newspapers. No local tuberculosis committee. Supervisor opposed to the hospital.

Town of Fine. Located in Adirondack Mountains. Population, 2,234, rural. No incorporated villages. No newspapers. No local tuberculosis committee. Supervisor favorable to the hospital, wife having died of tuberculosis.

Town of Gouverneur. Population, 6,020, including incorporated village of Gouverneur with a population of 4,218. Two weekly newspapers, both favorable to hospital, one especially so. Active local tuberculosis society. Supervisor opposed to the hospital.

Town of Hammond. Population, 1,745, including the incorporated village of Hammond with population of 404. One newspaper, which favored the hospital. Active local tuberculosis society. Supervisor opposed to hospital.

Town of Oswegatchie. Population, 18,168, including city of Ogdensburg with population of 15,933. Three newspapers: one daily; two weeklies; all favored the hospital, especially the daily. Active local tuberculosis committee in Ogdensburg. Supervisor favorable to the hospital.

Town of Potsdam. Population, 8,725, including incorporated villages of Potsdam (population 4,036) and Norwood (population 1,993). Three weekly newspapers, all favorable to hospital. Active local tuberculosis societies in Potsdam and Norwood. Supervisor opposed to hospital.

Town of Russell. No railroad. Population 1,842, rural. No incorporated villages. No newspaper. No local tuberculosis society. Supervisor opposed to hospital.

About a month before the spring elections the State Charities Aid Association, the organization engaged in the campaign against tuberculosis in coöperation with the State Department of Health, was apprised of the intention of four supervisors to refer the hospital question to their constituents. Two weeks before the elections we learned that there would be referenda in three other towns, and on only four days before the elections we heard that the supervisor of the eighth town, and one of the most rural ones at that, intended to have his constituents pass upon the question.

A field agent was sent to the county a month before election to direct the campaign, and he was joined later by four assistants from the State Health Department and two others from our Association.

The field workers wrote news articles and editorials for the newspapers and had paid reading notices scattered through the pages of the last issue of each paper before election. No effort was made to hold mass meetings because these would be too expensive and the weather was too unreliable. Instead, each field worker secured the privilege of the floor at meetings of all kinds of organizations. Addresses were made before lodges, fraternal organizations, women's clubs and granges, and the passage secured of suitable resolutions on the part of these societies. The favorable action taken and the resolutions adopted by each society were printed in the

papers. On Sundays the hospital question was presented from the church pulpits, and in several towns union services of the churches were held. Personal interviews were had with doctors, clergymen and leading citizens generally, and they were urged to vote favorably and to ask their friends to do likewise. Effective assistance was rendered by members of local tuberculosis committees in the canvassing of the voters in the towns where such societies existed.

Cards, 11 x 17, were displayed in the shop windows, in the post offices, general stores, and on trees and telegraph poles, bearing the injunction, "Cast a Vote for the County Tuberculosis Hospital and Do Your Share toward Stamping Out the Disease." Small cards were inserted in the pay envelopes of those employed in the industrial establishments of the city of Ogdensburg and several of the larger villages.

A week before election the State Charities Aid Association sent from its headquarters in New York City to each enrolled voter in each of the towns a copy of the January issue of the *State Charities Aid Association News*, the society's publication, and in which appeared a four-page statement of the report of the county investigating nurse on 222 cases, throwing into startling prominence conditions surrounding uncared-for tuberculosis in the county. This was followed up two days before election with a mailing card to each voter, giving the estimated cost of construction and maintenance of a hospital for St. Lawrence County, a picture of a hospital in another county and a summary of the reasons for hospital provision. This was used not only as a follow-up method, but also to refute statements made by a newspaper and several public officials and others opposed to the hospital, greatly exaggerating the cost of hospital provision and claiming that patients would be forced to go to the hospital and detained there against their will.

On election day several paid assistants and a number of volunteer workers were stationed at the several polling places in each of the towns, and as the voter approached the polls he was asked to vote favorably and at the same time was handed a small slip of paper printed, "Vote 'Yes' on the County Tuberculosis Hospital Question."

These paid assistants and volunteers had been drilled by the field workers on the arguments for and against hospital provision and were able to answer inquiries and meet objections made by the passing voter.

The results of the referendum in each town were as follows:

<i>Town.</i>	<i>Yes.</i>	<i>No.</i>	<i>Majority.</i>
Canton,	887	465	422
DeKalb,	352	212	140
Fine,	(Carried, but record not kept.)		
Gouverneur,	1,001	115	886
Hammond,	257	84	173

Oswegatchie,	1,225	214	1,011
	(Including city of Ogdensburg.)		
Potsdam,	623	163	460
Russell,	191	154	37
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Total,	4,536	1,407	3,129

The total majority was three to one, and in the several towns the majorities ranged from 1.24 to 1 to 8.70 to 1.

What effect this informal referendum taken in eight towns will have on the supervisors of the remaining twenty-four towns when the hospital question is considered at the annual session next December, is a matter of conjecture. Undoubtedly the effect in some cases will be salutary. At a special session of the board held last April and lasting only one day and at which only routine business was transacted, an effort was made to secure favorable action on the hospital question. But the objection that the newly elected members should not be required to vote on such an important question without full opportunity to familiarize themselves with it, prevailed, and consideration of the hospital resolution went over until the annual session. It was noted with satisfaction that the supervisor of each of the towns holding a referendum voted to take favorable action immediately, and that several of them who were opposed to hospital provision before the referendum argued vigorously for the hospital. Since the special session, two of the influential newspapers in the county have forecasted favorable action at the annual session.

The results of the referendum have been very encouraging to the public health workers in New York State. We now know that the people are with us. We now know that the people, when posted on this question, place the man above the dollar. Having carried the referendum in a county so distinctly rural as St. Lawrence, we feel confident that a referendum can be carried in any county in the state. We think we see in the referendum a short cut for securing affirmative action on hospital projects in counties where boards of supervisors fail to make the needed appropriations. It is not unlikely that we shall soon seek from the legislature an amendment to the law whereby, upon the petition of a percentage of the voters of the county, the question of establishing a tuberculosis hospital can be referred to the people.

EXAMINATION OF RIVER BOTTOMS AT PHILADELPHIA.

W. L. STEVENSON,

Assistant Engineer, Sewage Disposal, Bureau of Surveys.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

The officials of the Bureau of Surveys for several years have been studying the problem of the collection and disposal of the sewage of the city of Philadelphia, in order to prepare a plan for submission to the State Department of Health, in accordance with the Act of April 22, 1905, which controls the discharge of sewage in the waters of the state of Pennsylvania.

Early in these studies it was evident that the Delaware River must be the ultimate point of disposal of the sewage of the city, no matter how it would be collected or treated.

The condition of this river was, therefore, especially important, 1st: As showing the effect upon it of the present method of discharge of crude sewage from the sewers, and, 2d: In order to determine the probable degree of treatment required in order to maintain the river in a clean condition when the population of the city increased and when the sewage would be collected and discharged at a few points.

Over a period of two years the condition of the river water at various points was observed, principally by means of the dissolved oxygen test, as this gives the results of the activity of the biological forces at work in their effort to purify the polluting materials discharged into the river.

It was also necessary to know whether the depletion of dissolved oxygen in the river water was due to the dissolved and suspended organic matters or to deposits of sludge of sewage origin upon the bottom of the river. To determine this latter fact the examinations of the river bottoms herein described were undertaken.

CONDITIONS AT PHILADELPHIA.

The city of Philadelphia is situated on the west bank of the Delaware River, about 100 miles above its mouth; it is about 2,000 feet wide, has a channel approximately 30 feet deep, and a tidal range of $5\frac{1}{2}$ feet.

The flow of upland water above Philadelphia, in months free from freshets or drought, is estimated at 4,050 second-feet, and during the tidal flow 2,421,000,000 cubic feet of water flow past the city in 7 hours, 32 minutes.

The Schuylkill River flows through the city and discharges into the Delaware River near the southern end. The normal flow of the river amounts

Examination of River Bottoms at Philadelphia 1073

to 1,270 second-feet. About midway in its distance through the city there is a dam, forming a pool, from which the city takes one-third of its water-supply, the remaining two-thirds being taken from the Delaware River near the northern boundary of the city. Both river waters are purified in slow sand filters before delivery to the consumers.

The built-up portion of the city of Philadelphia is very completely sewered upon the combined system, which discharges into the creeks and rivers. That part of the water-shed of the Schuylkill River within the city limits and above the aforesaid dam is sewered upon the separate system, the sanitary sewage being conveyed by an intercepting sewer to a point below the dam and discharged into tidal water, in order to protect the source of the water supply.

FRANKFORD CREEK.

Along this creek there are several pools in which the velocity of the water is inadequate to keep sewage solids in suspension, and the bottom of the creek is covered in such places with a heavy deposit of sewage sludge. In warm weather digestion occurs, thereby liquifying and gasifying a part of the organic matter of the deposits.

While this creek carries the sewage from a population of about 140,000 persons and much industrial waste, when it is discharged into the Delaware River it contains much less material capable of settling than would be produced if sewers from an equal population discharged directly, due to the natural sedimentation, digestion and liquifaction.

LOWER SCHUYLKILL RIVER.

The portion of the Schuylkill River below the dam is tidal and has very low velocities of flow. During times of drought, due to the demands upon the river for water supply, almost no upland water flows over the dam and as the sewage from about 455,000 persons in Philadelphia is discharged into this portion of the river, the water is grossly polluted. With the exception of a few portions of this part of the river where the channel is narrow and higher velocities caused, the entire bed of the lower Schuylkill River is covered with deposits of sewage origin. Near the mouth, where the river is broader, they are several feet thick and cause, even in cold weather, constant ebullition of gas. The waters of the Schuylkill River when discharging into the Delaware are almost exhausted of dissolved oxygen. This is probably caused not only by the fresh sewage added each day but also by the putrefying deposits on the bed of the river.

As in the case of Frankford Creek, the deposition of the settleable matter from the sewage upon the bed of the Schuylkill River and its subsequent digestion and liquifaction very materially reduces the amount of sludge producing material reaching the Delaware River from the Schuylkill River.

DELAWARE RIVER.

The sewers discharging into the Delaware River do not generally have their outlets in or near the channel where maximum river velocities exist. Along the developed river front they mostly discharge at the bulkhead into the docks where there is very little movement of the water due to obstructions of the piers. In these cases deposition of sewage matter occurs as in the case of Frankford Creek and the Schuylkill River.

There is, therefore, discharged into the main channel of the Delaware River from the docks, from Frankford Creek and from the Schuylkill River, sewage from the entire city of Philadelphia, with a population of 1,600,000, which has been subjected to a crude form of natural sedimentation.

The velocity of the main channel of the river during the tidal flows is quite high and sufficient to maintain in suspension the finely divided sewage matters. The entire bed of the Delaware River in front of and below the city of Philadelphia, except in the docks near sewer outlets, is practically free from deposits of sewage origin. In fact, it was found impossible, with the apparatus used, to collect any samples of the bottom over a large part of the river.

On the accompanying diagram there is shown the points at which the river bottom was examined. The light open circles represent where the bottom was so hard that no sample could be collected. The heavy open circles represent points at which a sample was obtained but its examination showed no evidence of sewage origin. The half-filled circles represent samples in which it was doubtful if the material found was of sewage origin. The full circles represent samples of undoubted sewage origin, as determined by the presence of such objects as hair, paper, vegetable and meat fibres, etc.

FIELD METHODS.

The samples of the river bottom were obtained from a boat whose location was determined at the time of sampling by sextant observations of known locations on shore.

Several types of apparatus were tried in order to obtain samples, even when the deposit was hard and of only a thin layer. The form finally adopted consisted of a heavy galvanized cylinder six inches in diameter and nine inches long. The top had a hinged cover capable of being raised only and with a rubber gasket seat, so that when the apparatus was hauled up the sample would not be washed out. To the lower part of the cylinder was soldered a galvanized iron cone in which lead was poured to weight the point. About where the cone joined the cylinder were four round holes one inch in diameter and provided on the inside with hinged valves only capable of opening inward.

PLAN FOR THE COLLECTION AND DISPOSAL OF THE SEWAGE

CITY OF PHILADELPHIA
SANITARY SURVEYS OF THE RIVERS,
DEPOSITS ON THE RIVER BOTTOM
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SURVEYS



When this apparatus was lowered to the bottom it sunk in the deposit which was admitted to the inside through the four small holes. It was then moved up and down a few times to cause it to fill more completely. The valves prevented the deposit from flowing out or water flowing in while it was hauled to the boat. The supernatant water was poured off and a pint jar filled with the deposit, its characteristic noted, such as "sandy," "foul odor," "thin mud," etc.

LABORATORY METHODS.

The samples were not examined in the laboratory until the following day. When the jars were opened the odor was noted. If gas had accumulated in the top of the jar it was tested with a flame to see if it would burn, and, if not, again tried while the contents of the jar were being stirred. 50 cc. of the deposit was placed in a pint jar, which was filled with aerated tap water. This was kept at room temperature for about five days, when the amount of dissolved oxygen consumed by the deposit was determined, to show the putrescibility or stability of the sample.

The sample in the original jar was emptied into a sand sieve having 20 meshes per inch, which was then alternately moved up and down in a flat cylindrical glass vessel containing clean water. This washed the finely divided mud through the sieve. The operation was completed by using fresh water until the *débris* in the sieve was freed from mud.

In undoubtedly polluted samples the microscopist had no trouble in at once fishing out characteristic *débris* of sewage origin. From samples not grossly polluted the *débris* was fished out of the screen and cleared up in 10 per cent. hydrochloric acid, then mounted in glycerine and examined under the microscope.

Permanent mounts were made of various materials, such as fibre from linen, silk, wood, vegetables and different kinds of meats. To these were added known objects recovered from the samples. These served as standards for the identification of unknown objects obtained from the river bottom.

CONCLUSIONS DRAWN FROM THE OBSERVATIONS.

It was reasonable to expect that samples which exhausted the dissolved oxygen in the laboratory, formed inflammable gas and emitted foul odors, were of sewage origin, and that samples which did not materially exhaust the dissolved oxygen, did not produce gas and were inodorous, would not contain evidence of sewage pollution.

These two statements were well borne out by the observations. The interesting features observed were the exceptions, among which the following may be noted:

A sample collected on the New Jersey side of the river at the end of the

[illegible]

water-works wharf showed no evidence of sewage pollution when examined microscopically, no gas was formed in the sample and it did not have an offensive odor. The sample, however, completely exhausted dissolved oxygen in the tap water added to it in at least four days. This inconsistency is explained by the presence of a large number of snails in the sample and serves to show that methods of examining river mud based entirely upon chemical observations may lead to fallacious conclusions.

On the other hand, samples which the microscopist reported as containing ample evidence of sewage pollution did not materially exhaust the dissolved oxygen, did not form gas and were practically inodorous.

The interpretation of this anomaly may be that while the deposit from which this sample was taken was originally of sewage origin, fermentation and decomposition had so destroyed the organic matter in the deposit that it was no longer in a putrescible condition and only the more resistant structures, such as hairs, linen fibres and cellulose still remained to indicate the original source of the deposit.

This would show that conclusions based solely upon microscopical observations are not complete, and it is the writer's opinion that fair conclusions can only be drawn from observations including microscopical examination, physical observations and a determination of the putrescibility of the sample as measured by its power of deoxygenating water.

In the accompanying table the characteristics of some of the samples are given, which support these ideas.

ACKNOWLEDGMENTS.

The writer wishes to give due acknowledgment to Mr. George S. Webster, Chief Engineer, Bureau of Surveys, for permission to use the data herein given and for helpful advice and suggestions during the work; to Mr. George E. Datesman, Principal Assistant Engineer, Bureau of Surveys, for his valued suggestions, based upon his intimate knowledge of the Delaware and Schuylkill Rivers; to Dr. George A. Soper, President of the Metropolitan Sewerage Commission, New York City, for advice and suggestions additional to the published method used by that Commission in New York Harbor; to Mr. Wm. B. Erichson, who had charge of the field work and chemical examinations in the laboratory; and to Dr. Carl Stienke and Dr. J. Douglas Blackwood, who made the microscopical examinations.

WATER SOFTENING AND DECOLORIZATION.

W. A. SPERRY,

Chief Chemist, Grand Rapids Filtration Plant, Grand Rapids, Mich.

Read before the Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

The first six months of experience at the Grand Rapids Filtration Plant has demonstrated that no plant can be successfully run by "rule of thumb." Every water supply, especially if it be a surface water supply, carries some features that make the treatment of that water distinctive and set apart.

The Grand Rapids plant started full normal operations about November 1, 1912, drawing water from the Grand River. It being originally proposed to soften this water down to about 125 p. p. m. total hardness or what is generally known as the Lake Michigan standard and to reduce its color to 10 parts p. p. m. or less on the Platinum Cobalt scale.

The Grand River drains an area of some two thousand square miles of sandy soil full of marshes and small lakes with but little clay ground, being largely adapted to orchards and small fruits. Moreover, the water is quite hard due to lime stone outcroppings.

When one steeps tea-leaves in water there results a color, an odor, and a taste. The distinctive problem at the Grand Rapids plant has proved the removal of the effects of the steeping of the meadows in water that subsequently reached the Grand River. The problem was rendered more difficult in that in addition to its color the water was hard and hard waters seem more difficult to decolorize than soft waters, provided there is an absence of clay.

In this respect it is interesting to compare the water supply of Columbus, Ohio, with that of Grand Rapids. The Grand Rapids supply, as noted above, is drawn from a sandy soil underlain with lime rock containing but little clay and with much vegetation, and spotted all over with lakes and ponds.

The Columbus supply is taken from the Scioto River which flows through a limestone region wholly clay and devoted to general farming operations with little or no swampy ground and but little sand.

This results in a water at Columbus whose turbidity and total hardness rises and falls through great ranges in very short periods of time—it being not unusual for the turbidity, for instance, to increase from 25 parts per million to 2200 p. p. m. in a period of eight hours following heavy rains over the watershed with a corresponding decrease in the hardness of the water.

These phenomena are due to the clay nature of the soil which lacks the "soaking up" and conserving capacity of lakes and sand and makes the Columbus problem largely one of coping with rapid changes of turbidity and hardness but with the color problem removed in that the presence of much clay in this water tends to absorb and therefore eliminate its color.

At Grand Rapids, on the other hand, the highest turbidity observed in the past six months has only been 135 p. p. m. with an average turbidity of 20 p. p. m. Moreover, due to the watershed being twice the area of the Scioto watershed, and due to the much sand and many small lakes which tend to absorb and conserve storm water, the river does not rise and fall so rapidly nor does it get very turbid, and because of the absence of much suspended clay—turbidity—the color as well as a slight marshy taste and odor which accompanies the color is much more persistent and difficult of removal. A secondary effect in rendering the color, odor and taste more difficult of removal is found in the opportunity for leaching out of the vegetable matter over the watershed offered by the conditions of which tend to hold back the water.

An interesting result of this condition is found in the summer time, when, following a general rain, the color and taste become more pronounced, due to the washing into the stream of pools formed as a result of low water, where this leaching effect has become exaggerated.

Ordinarily sulphate of alumina or iron are used as decoloring agents their efficiency depending on the fact that the reaction between the natural alkalinity of the water and the alumina or iron tends to break the latter up with the formation of alumina or iron hydrates whose physical properties of weight, insolubility, and the possession of a bulky gelatinous mass, tends to make them absorb and reduce color and the accompanying odor and taste.

In the case of very soft and highly colored waters such as are found in the East, it is necessary to supply a sufficient alkalinity to decompose the sulphates of alumina or iron in the form of lime hydrate or slacked "quick-lime" and iron has in almost every case been found to work more efficiently when accompanied with sufficient lime to produce a slight excess of hydrate alkalinity even though there be already present in the water sufficient bicarbonate alkalinity. Moreover, iron seems to exert more decolorizing and deodorizing power on some waters than alum as is claimed for its use at a plant recently completed at Fargo, North Dakota, though alum seems much more generally applicable. Where iron can be used it proves quite desirable due to the lesser expense of iron as compared to alum.

The total hardness of the water at Grand Rapids has averaged 217 p. p. m. with a maximum of 288 p. p. m. and a minimum of 104 p. p. m. This has been accompanied by an average color of 32 p. p. m. and an average turbidity of 20 p. p. m.—the color ranging from 16 to 55 p. p. m. and the turbidity from 5 to 135 parts per million as minima and maxima. This

total hardness is made up of the bicarbonates of calcium and magnesia averaging 188 p. p. m. accompanied by about 30 p. p. m. of sulphates and an average of 17 p. p. m. of magnesium for the past six months.

The first few days of operation showed that the amount of alum necessary to produce a water whose color was 10 p. p. m. or less was excessive—a water carrying a color of thirty to forty parts per million requiring three to four and one-half grains per gallon of alum to produce a water of the above requirements. Such treatment was not only expensive but so increased the sulphate or permanent hardness as to produce a very disagreeably hard water.

Meantime laboratory experiments indicated that the use of lime would not only soften the water but decolorize it as well and at less expense.

It is oftentimes a puzzle as to why "lime" is used to remove "lime." It is a basic chemical principle that an acid will combine with an alkali to produce a neutral body which is neither acid or alkaline. Calcium and magnesium salts are largely present in a water by virtue of the solvent action of the carbonic acid gas dissolved in the water and are therefore present in an acid condition. By the addition of an equivalent amount of an alkaline form of lime—calcium hydrate—there is produced a neutral body which is insoluble and if there should be five parts of such acid calcium or magnesium present in a water the addition of five parts of calcium hydrate—an alkaline form of lime—would precipitate out of the water 10 parts of lime which would contain the lime added as well as the lime present in the water. Moreover, magnesium so precipitated has much the same form physically as do the hydrates of alumina and iron and is available for the same uses—as coagulants to remove turbidity or color.

It was proposed therefore to utilize the magnesium in the Grand River water supply through the softening process as a decolorizing agent.

Ordinarily the softening processes can be carried to any point desired up to the full neutralization of all acid lime present. At the Grand Rapids plant however, it was soon found that unless sufficient lime were added to completely neutralize all bicarbonate or acid alkalinity that the magnesium was not precipitated in a form to be sufficiently available for decolorizing purposes and therefore we were compelled either to soften the water to a point much lower than the 120 or 125 parts per million desired or else operate at greater unit cost in that a partial softening of the water made it necessary to use two to three grains of alum in addition to the lime to produce a satisfactory color.

On the other hand, by the addition of lime sufficient for the full neutralization of the bicarbonates present, it was found that we could produce a water whose color was 10 or less and whose total hardness ranged from 88 to 100 parts per million for the past six months. By so doing we were able to reduce the alum required to an amount as low as one-fourth grain per

gallon, its function being largely to help carry down the fine crystals of calcium carbonate formed in the softening process.

From the standpoint of the consumer, this was excellent, in that the water so produced was soft enough to lather freely in the cold and without the formation of the "scums" that are so disagreeably characteristic of hard water as well as a water whose color was no longer noticeable. In addition this later method of treatment enables us to operate at a much less cost per million gallons than by the use of alum.

The use of alum, then, offered as an advantage color removal alone and as disadvantages increased cost of operation and increased hardness of the water produced.

The use of lime offered as advantages the reduction of both hardness and color at greatly reduced cost as compared with alum, the disadvantages from the operators' standpoint being that once the people of any community become accustomed to a very soft water they also become sensitive to any upward changes of hardness and are therefore liable to notice and object to any increases in hardness later on.

So far as we have been able to study and observe our problem this method of treatment with lime has proved most efficient and economical for all classes of waters the seasons have brought to our plant. Whether the color drop to as low as 20 p. p. m. as in the hard waters of the summer time or rise to 60 or 70 p. p. m. following the spring floods it requires excessive amounts of alum for its removal, and lime, therefore, proves most efficient save for these short periods when the total hardness gets as low as 100 to 120 p. p. m. with the magnesium in the water falling off to 10 to 15 p. p. m., at which time alum must of necessity be used.

The average reduction of magnesium in the filtered water as compared to the river water following such treatment as the above has been 25 per cent.

THE EFFECT OF RENOVATION OF BUTTER UPON THE REICHERT MEISSL NUMBER AND SAPONIFICATION VALUE.

F. O. TONNEY and F. W. STOCKTON.*

Read before the Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

In connection with the examination of a series of samples of ice cream by the Health Department Laboratory of Chicago, in the course of which the presence of foreign fats was demonstrated in a few instances, the contention was raised by scientific counsel representing one of the ice cream manufacturers that reprocessed butter often yields a low Reichert Meissl number and saponification value; that, judging from the data furnished by these tests, it is often impossible to distinguish renovated butter from mixtures of butter and foreign fat. As a basis for this contention it was stated that the alleged lowering of the findings of these two tests was due to a loss of volatile acids occurring during the process of renovation, as a result of the heating and washing. The assertion was confidently made that the aforementioned loss of volatile fatty acids may represent as much as one third of the volatile fatty acid content, as determined by the Reichert Meissl method.

It was the opinion of the city's experts that the loss of volatile acids occasioned by the process of renovation would be slight, and would not in any case be sufficient to invalidate the test as a means of distinguishing genuine butter from other fats.

The firm in question admitted that renovated butter had been purchased for the preparation of homogenized cream, used in the manufacture of ice cream, but disclaimed any knowledge of the use of oleomargarin or other foreign fats for this purpose. The purchase of supplies, however, had not been controlled by laboratory tests.

As very little definite data could be found upon the point in question, however, it was decided to undertake the series of tests here reported. The procedure adopted was as follows:

Samples of butter purchased in the open market were subjected to tests for the determination of the Reichert Meissl number and saponification value. They were then placed in an incubator, at 37°C., for from three to five weeks, until an extreme degree of rancidity developed. The samples were then reprocessed by blowing steam through them for two

*From the Laboratory of the Department of Health, Chicago.

hours, cooling and washing the product; after which the determination of the Reichert Meissl and saponification values was again carried out.

The Reichert Meissl method described by Leffman and Beam was used, and the method selected for determination of the saponification value was that of the Association of Official Agricultural Chemists, Bulletin 107 (Revised) United States Department of Agriculture.

Thirty-two samples in all were subjected to examination, results of which are given below:

No.	Reichert Meissl Number.				Saponification Number.		
	Before renovation.		After renovation.		Before renovation.	After renovation.	
	Butter.			Difference.			Difference.
1.	Fresh	28.0	27.3	— .7	227.4	227.5	+ .1
2.	"	30.5	29.2	— 1.3	232.4	232.3	— .1
3.	"	29.0	28.6	— .4	230.3	229.9	— .4
4.	"	31.4	30.1	— 1.3	232.1	232.3	+ .2
5.	"	30.0	29.4	— 1.3	231.4	231.2	— .2
6.	"	29.1	28.5	— .6	231.4	231.2	— .2
7.	"	28.2	27.7	— .5	229.5	228.7	— .8
8.	"	29.1	29.4	+ .3	229.1	229.5	+ .4
9.	"	28.3	27.9	— .4	228.6	228.6	0
10.	"	26.5	27.0	+ .5	229.0	229.2	+ .2
11.	"	29.5	28.8	— .7	229.3	229.4	+ .1
12.	"	27.7	26.8	— .9	228.0	228.0	0
13.	"	30.2	29.8	— .4	229.9	230.8	+ .9
14.	"	29.6	28.2	— 1.4	228.8	229.5	+ .7
15.	"	30.0	29.1	— .9	231.8	232.4	+ .6
16.	Renovated	28.1	28.0	— .1	229.2	230.2	+ 1.0
17.	"	27.9	28.4	+ .5	227.9	227.7	— .2
18.	"	26.9	27.6	+ .7	228.2	227.4	— .8
19.	"	26.8	26.0	— .8	227.9	228.0	+ .1
20.	"	25.3	26.1	+ .8	228.7	228.9	+ .2
21.	"	24.8	26.0	+ 1.2	226.8	226.9	+ .1
22.	"	24.5	25.3	+ .8	226.8	227.2	+ .4
23.	"	27.0	25.9	— 1.1	226.9	227.5	+ .6
24.	Fresh	28.2	27.4	— .8			
25.	"	26.5	26.2	— .3			
26.	"	24.1	23.8	— .3			
27.	"	24.0	25.7	+ 1.7			
28.	"	27.3	26.3	— 1.0			
29.	"	26.4	24.6	— 1.8			
30.	Renovated	26.3	27.6	+ 1.3			
31.	"	29.3	26.4	— 2.9			
32.	"	29.3	25.4	— 3.9			
Average decrease.					— .48	Average increase. + 0.1	

The experiments were conducted under very rigorous conditions, both as to the degree of rancidity and the thoroughness of renovation, and in some cases also the renovation represents the second time that the butter had been reprocessed. It will be seen by examination of the table that

the variation of results before and after renovation is relatively small, while the average of the differences is practically nil. These findings are in accord with the results of a similar series of experiments made by Crampton* on the same subject.

The conclusion, we believe, may safely be drawn that any reduction in the two values mentioned occurring in the process of renovation of butter is practically negligible, and does not in any way affect the validity of the tests as means of distinguishing genuine butter from other fat mixtures.

* "The Composition of Process or Renovated Butter," C. A. Crampton, *Jour. Am. Chem. Soc.*, 25, 1903, p. 358.

THE DECOLORIZATION OF THE LITTLE RIVER WATER SUPPLY IN CONNECTION WITH FILTRATION AT SPRINGFIELD, MASS.

ELBERT E. LOCHRIDGE.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

Sulphate of alumina as a coagulant and decolorizer is in use on many waters in the United States, and is recognized as one of the most effectual means of reducing an objectionable color in the water prior to filtration. The river water as applied to the West Parish filters of the Springfield water supply is naturally a water of few objectionable features. No large population is resident upon the water-shed and the sanitary conditions are excellent so that there is not a large danger of serious contamination of the supply at any time.

By filtration a water free from practically all objections is produced, except that at times, the remaining color is noticeable, and the present system of coagulation is the result of a study of the means of correcting this one objection to the water.

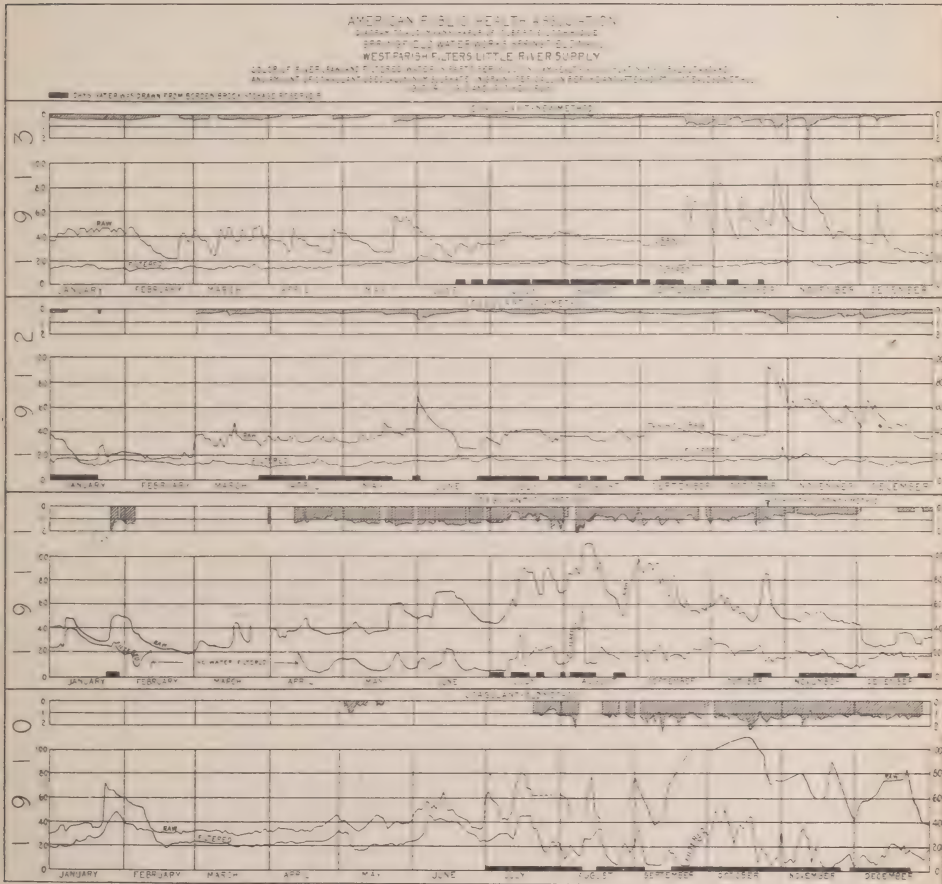
This water was first used as a supply in December, 1909, and sulphate of alumina was used for the reduction of color in the manner in which it is usually applied. The accompanying cut showing the use of coagulant during 1910 illustrates the amount of sulphate of alumina which was necessary for this reduction. Its application during this year was in accordance with the usual practice, that is, in amounts sufficient to secure a clear-cut reaction and the coagulant was applied continuously. The present method is illustrated by the chart showing the amounts and the color of the raw and filtered water during 1912 and 1913.

As at present practised, excellent color reduction is secured by the use of 0.2 grain of sulphate of alumina per gallon of water during a larger portion of the time.

METHOD OF APPLICATION AND DETERMINATION OF AMOUNT NECESSARY.

It has long been recognized that better results are secured from the sulphate of alumina in an acid water, and this fact may have some bearing on the results obtained. From ten to twenty samples of water are taken in two-gallon bottles and placed in a row on the laboratory table. To these are added varying amounts of sulphate of alumina from a standard solution, so that the effect of each amount is determined, both as to its final effect and as to the length of time necessary for reaction. For example, to the first bottle an amount which would be equal to one grain per gallon is added, to the second 1.1, to the third 1.2, etc., up to perhaps 2.0

or even 2.5 grains per gallon. In this manner for the water of that day the amount of coagulant is determined which will quickly throw down substantially all of the color with a good precipitate in a very short time. If, for example, this reaction is found to be 1.7 grains of sulphate of alumina per gallon, the feed apparatus for coagulant for the main supply is set for a feed of say 1.9 grains of sulphate of alumina per gallon. This amount



thus applied is always in excess of the amount necessary for the complete reaction and is also an amount which exceeds the available alkalinity of the water, so that in the prompt reaction obtained all of the alkalinity is used up and an excess of sulphate of alumina is applied to the water.

The application of this coagulant is made in a concrete conduit which delivers the water from the river into a settling basin having a capacity of about 40 million gallons, which is a little over three days' supply.

This rate of coagulation is continued for a period of from four to six hours

and then the coagulant is shut off entirely and the river water allowed to flow in its natural state into this same basin uninterruptedly.

The effect of this intermittent feed applied from 15 to 30 per cent. of the total time is twofold. In the first place the amount of water coagulated with a color substantially 0 is added to this large basin, and the effect of mixing of water of a color of 0 with water with a color of 40 represents one of the factors in the decolorization of the water. On account of the excess amount applied, a mass reaction has taken place and all of the alkalinity and coloring matter has been combined with the coagulant. A second reaction becomes effective at the outlet of the conduit where the water is thrown into contact with the remaining and uncoagulated water and this reaction has the further effect of neutralizing all of the sulphate of alumina not as yet precipitated. There is also another effect which has been recognized in some places in the application of a hydrate of alumina to water, in the effect which the flocs thus introduced but not precipitated at that point will have in the improvement of the water. These conditions produce when properly applied, a uniformly good water of satisfactory color, with a total expenditure for coagulant of not over 25 per cent. of the amount required if the coagulant is applied continuously.

Further information was obtained by applying the same amount of coagulant throughout the twenty-four hours or even twelve hours without any effect on the reduction of color whatever; so that it will be seen that it is necessary to get the clear-cut reaction which is noted above in the water actually treated.

The determinations outlined are made daily or at frequent intervals when little change is to be noted in the character of the raw water, but are absolutely necessary for the determination of the right amount to be applied if the stream is rising or falling, or changing in its nature as such streams do from day to day. It can also be seen that the alkalinity of the water plays but a minor part in this reaction, inasmuch as the hardness must be entirely utilized or combined only during the period of application; and it has been found by experiment that the changes in alkalinity have not been as important as have the source of supply. Different amounts were needed for the treatment of the water following rains where high level swamps have overflowed into the stream, from that necessary when water is drawn from the storage reservoir, and different amounts have been needed for water from the storage reservoir when drawn from different levels or at different seasons.

This method of treatment has an additional advantage in the removal of the necessity of adding soda ash or other chemicals for the hardening of the water, inasmuch as in the full reaction but a part of the alkalinity even of a very soft water is used.

Mr. Herbert F. Salmonde has been the chemist in charge of this work, and it is under his direction that the reactions have been determined on the Springfield water.

RATIONAL BASIS FOR THE SANITATION OF RIVERS AND HARBORS.

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President Metropolitan Sewerage Commission of New York.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

For the sanitation of rivers and harbors to have a rational basis, the work must be conducted upon principles concerning which right-thinking persons can agree. They cannot agree that in every case all sewage must be kept out of the water nor that unlimited quantities should be allowed to enter it. Many natural bodies of water can assimilate some sewage without appreciable harm to the public health and welfare and if the work of sanitation is to be conducted in an economical as well as efficient manner, it is essential that this asset should be intelligently utilized.

In determining what is rational, due consideration must be given to the question of expediency. It is necessary to consider what it is feasible, as well as what it is desirable, to accomplish. If the undertaking is not based upon an intelligent understanding of what is practicable, the result is certain to be disappointing.

There is often a disposition, especially on the part of health authorities, to impose unnecessarily severe requirements upon cities as the result of a too zealous effort for the public welfare. If the sanitation of rivers and harbors is to be conducted in a rational manner, due regard must be given not only to the health of the public, but to the practicability and cost of carrying out the desired improvements.

The work of sanitating rivers and harbors is essentially preventive work. The waters must not be allowed to become foul. It is extremely difficult to clean a dirty river and were it easy, it would not be wise to allow the water to become grossly polluted before the cleaning operations are begun. Paraphrasing Colonel Waring's remark in regard to street cleaning: "The effort should not be to clean dirty rivers, but to keep clean rivers clean."

Before undertaking to sanitize a river or harbor, an agreement should be reached as to the degree of cleanness which is necessary and sufficient under the circumstances. When this is done, the work will proceed with much more likelihood of success than where the effort is merely to accomplish the best results attainable with a given process. There is no transcendent virtue in any type of apparatus; experience shows that the efficiency of the best apparatus depends largely upon the care and intelligence with which it is operated.

The way in which a standard of cleanness should be expressed depends upon the manner and extent to which the polluting materials do harm. It is a mistake to suppose that a standard of purity can be formulated which will be suitable for all rivers and harbors. Conditions which constitute a nuisance in one situation may be quite permissible in another. A great deal depends upon the manner and extent to which persons and property may be affected. The way in which a river or harbor should be sanitized, therefore, depends upon the uses to which the water is put.

In preparing a standard of cleanness, it will be desirable to describe the conditions which are to be prevented rather than the quality of the water which should be maintained. Purity and cleanness are negative qualities, and it is the absence of the offensive and injurious which should be insisted upon. The degree of cleanness required may be termed the permissible limit of pollution or the standard of purity for the water. Whatever the term employed, the standard should be regarded as the limit beyond which the water is not to be allowed to become foul.

Some contamination is inevitable and should frankly be so considered, for excepting under unusual circumstances, it will be impracticable and unnecessary to keep all sewage out of the water. The water of which sewage is chiefly composed must go somewhere. If it is put upon the land, it will either pass over the surface or flow downward to the ground water and so be carried to the nearest open water course through the soil.

A standard of cleanness to be rational should be expressed in language which is simple and capable of ready interpretation. Formulas based upon chemical, bacteriological or other scientific data should be avoided as far as practicable as being unnecessarily involved and requiring interpretation before their meaning can be clearly understood. Sometimes chemical expressions cannot be omitted; in this event it is desirable that the most simple criteria be employed. When chemical standards are employed, it will usually be better to state the minimum percentage of dissolved oxygen which the water should possess than the maximum proportion of nitrogen compounds which are permissible.

In most instances, no criterion based solely upon the appearance of the water or its chemical or biological condition will be found satisfactory, and a standard of cleanness based partly upon the analytical composition and partly upon the pollution as it affects the senses will be found best.

The customary reasons for sanitating rivers and harbors are the prevention of sickness and the avoidance of nuisance, and the standard of cleanness should have reference to this fact. It is interesting to observe that although it is the prevention of sickness which is the more important consideration, it is the avoidance of nuisance which most often leads to improvements being made.

In regard to the danger of sickness, it is desirable to consider the imme-

diating channels by which the harmful substances in the water may cause disease. In practically every case where polluted water produces sickness, germs of disease are carried in some way from the water into the stomachs of the persons who are made ill. This transfer usually, but not always, occurs when the water is used for drinking purposes. In the case of tidal harbors, the eating and even the handling of shellfish from polluted bottoms may cause harmful germs to be taken into the system. Upon theoretical grounds, it would appear that there is danger in bathing in polluted water though there has been little evidence anywhere produced to prove that disease is frequently caused in this way.

Nuisances may arise from deposits of sewage solids either at the mouths of the sewers or at a considerable distance therefrom. In such cases the distance is usually short. In the worst instances, the waters become very polluted throughout, turn black and give off offensive gases. It is worth remembering that it is usually the deposits and not the water which produce these gases.

When the practicability of maintaining high standards of cleanness is considered, the problem of sanitating rivers and harbors is seen to be fraught with much difficulty. It must be admitted at the outset that no treatment can be given to sewage which will remove all the impurities except at high cost. The possibility of creating offensive conditions at the point where the works are situated must also be considered. Unless sewage works are situated in remote localities, they are liable to cause offense, especially such works as remove a large percentage of the impurities.

Nor can sewage, in the average case, be taken to some far-distant point for disposal without excessive cost. Cost is the great obstacle to the successful sanitation of rivers and harbors and must be continually balanced against the beneficial results to be attained. It appears to be hopeless to attempt to materially reduce the cost of sewage disposal by utilizing the manurial ingredients in the sewage except where the water itself is needed for irrigation.

Some ingredients of sewage can be extracted more readily than others and, fortunately, some of the most objectionable can be removed easily. It is comparatively easy to remove by screens those large solid particles which look offensive in the water and go far to produce deposits; but it is next to impossible to so treat the sewage as to remove the finer particles which cause the water to look turbid after the discharge. It is worth noting that those forms of treatment which are usually termed clarification seldom really clear sewage; they may remove a large amount of the suspended matter, but usually enough solids and semi-solids remain to cause the sewage to look turbid and to make the water into which it is discharged appear turbid also.

Instead of treating the sewage to make it perfectly clear, it is often better

to arrange the outlets so as to cause a prompt and complete dispersion of the sewage in the river or harbor. Sewage dispersion is by no means a simple matter. Especially when discharged beneath the surface of salt water, the sewage is likely to rise to the top by reason of its relative lightness, higher temperature and presence of air and grease and there remain.

For the sanitation of rivers and harbors to have proper basis, there should be provided a comprehensive plan for the reasonable disposal of the sewage, and this should be made out long in advance of the actual requirements. The plan should be in the nature of a program which can be followed out as time and the circumstances of the situation make necessary. The plan should be of such character as to provide all the protection needed for the river or harbor at an early date and be capable of extension so as to make the protection more complete as the quantity of sewage increases and the demand for clean water becomes more exacting.

THE EFFECT OF WATERS OF DIFFERENT QUALITY ON THE LONGEVITY OF SOME PATHOGENIC BACTERIA.

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During experiments on the viability of different strains of a pathogenic organism in various concentrations of some inorganic salts, it was noticed that some variations occurred, and it was thought desirable to carry out a series of experiments for the purpose of determining the effect of waters of different quality on the longevity of some pathogenic organisms.

In the series of experiments conducted, the method of exposing the bacteria to the various waters was by means of permeable collodion sacs immersed in litre samples of the water contained in Erlenmeyer flasks and supported by cotton plugs. For the purpose of approximating, as nearly as was deemed practicable, the conditions which exist in nature relative to variations in the composition of flowing waters, the flasks were emptied and the contents replaced by fresh supplies of the respective waters six times a day. In this way any detrimental effect on the organism due to staleness of the waters, resulting from keeping in glass containers for long periods, was eliminated; and any variation in the vitality of the organisms effected by changes in the composition of the waters could be determined in this manner.

The sacs were made by using a ten per cent. solution of collodion in equal parts of absolute alcohol and ether. After air-drying for two hours and shrinking under water for two hours, the sacs were removed from the tubes with but little difficulty. All sacs were tested for permeability and integrity, and only those sacs which remained intact after exposure for one week were selected for the experiments.

The waters to which the bacteria were exposed were distilled (in glass) water, entirely free from salts and organic matter; Madison city water, a hard artesian supply containing a very small amount of organic matter; Lake Mendota water, which is quite hard and contains a relatively large quantity of organic material; and sewage, which may be regarded as a concentrated solution of organic matter. With such a series of waters it was believed that any variations occurring in the viability of the organisms due to the influence of salts or organic matter, or both, might be ascertained and studied.

The organisms used were *B. coli*, two strains of *B. typhi*, *B. dysenteriae*, *B. cholerae* suis, *staphylococcus pyogenes aureus*, a (pathogenic) *streptococcus* and *B. diphtheria*; and rejuvenated pure cultures of each organism, with the exception of *B. diphtheria*, were obtained on lactose agar. When making the suspensions, in order to eliminate the organic material of the agar, only a portion of the upper surface of the growths were transferred to sterile distilled (in glass) water; and each cubic centimeter of these various suspensions contained between one and two million organisms.

In the first series of experiments the collodion sacs were divided into four sets, and the sacs of the first set filled with about ten cubic centimeters of sewage; the sacs of the other three sets were filled respectively with the same amount of lake water, city water and distilled water, plugged with cotton and sterilized (sacs suspended in flasks nearly filled with water and sterilized in auto clave). Each sac in the first series was then inoculated with one cubic centimeter of a suspension of one of the organisms, and a similar procedure repeated with the other three series of sacs. The sacs, partially filled with the waters and containing pure cultures of the respective bacteria, were then suspended by means of large cotton plugs in flasks containing litre samples of the same type of water contained within the sacs; and the flasks kept at room temperature. The waters in the flasks were replaced by fresh samples about six times a day. In this manner the effect of the diffusible substances in the waters on each type of organism could be studied free from the antagonism of the sewage and water bacteria.

Since the bacteria under observation were in pure cultures, it was unnecessary to employ special methods for their recovery, so the lactose agar plate method was used for the cultivation of all the bacteria with the exception of *B. diphtheria*, which was cultivated on blood serum: about five tenths of a cubic centimeter of the cultures were withdrawn each time from the sacs and placed in tubes containing slanted blood serum. Contaminations of the pure cultures due to breaks in the sacs were readily discernible by the appearance of different types of organisms on the lactose agar plates, and such contaminated tubes were eliminated from the experimental work.

Transfers from the sacs were made every other day, except in the case of *B. diphtheria*, which was transferred each day; and each type isolated was confirmed by cultural methods and microscopic examinations. The results obtained in this piece of work indicate quite conclusively the differences in the viability of the organisms under the same and different influences.

In this series of experiments, undertaken for the purpose of determining the effect of the diffusible substances and the by-products of the bacteria on the pathogenic organisms in general, and the influence of different

TABLE I.

LONGEVITY OF PATHOGENIC ORGANISMS IN PURE CULTURES EXPOSED IN PERMEABLE COLODION SACS TO THE DIFFUSIBLE SUBSTANCES OF SEWAGE, LAKE MENDOTA WATER AND MADISON CITY WATER.

Solutions contained in flasks.	Organisms exposed in pure cultures in sacs filled with the type of water in which sacs were suspended.							
	B. coli.	B. typhi. "A"	B. typhi. "B"	B. dys- enteriæ.	B. chol- era suis.	Staphy- lococcus aureus.	Strepto- coccus.	B. diph- theriæ.
Sewage.	1d+ 30d+	1d+ 14d+ 16d-	1d+ 18d+ 20d-	1d+ 22d+ 24d-	1d+ 18d+ 20d-	1d+ 30d+	1d+ 16d+ 18d- 20d-	1d- 2d-
Lake Mendota water.	1d+ 30d+	1d+ 16d+ 18d+	1d+ 22d+ 24d-	1d+ 26d+ 28d-	1d+ 16d+ 18d-	1d+ 30d+	1d+ 30d+	1d+ 2d+ 3d-
City water (ar- tesian)	1d+ 30d+	1d+ 26d+ 28d-	1d+ 30d+	1d+ 30d+	1d+ 26d+ 28d-	1d+ 30d+	1d+ 30d+	1d+ 9d+ 10d-

amounts of nitrogenous material and inorganic salts in particular, the results obtained are quite interesting, and manifest quite conclusively the influence of waters of varied composition on the viability of the bacteria used. It was noticed as the work progressed that the bacteria per cc. fell from the high initial numbers to decidedly lower limits within a few days. In all cases the decline in numbers was rapid and continuous during the first four or five days, and the great majority of the organisms disappeared during the first week; the bacteria remaining after that time were apparently the hardier ones capable of withstanding the detrimental influences of an unfavorable environment relatively much longer than the others.

It was also noticed that the pigmented organism, *Staphylococcus aureus*, after exposure to the waters for a week, became attenuated insofar as the loss of the power of secreting pigment was concerned; and several transplantations were necessary before this power was rejuvenated to its original strength.

One of the most interesting features of this series was the longevity of *B. diphtheria* in the city water. This organism was practically unable to resist the toxic influence of the liquids rich in nitrogenous organic material and the products of germ life, such as sewage and lake water; but in the case of the hard artesian city water, containing a very small amount of nitrogenous material, the organism survived for nine days. Such a combination of inorganic salts and nitrogenous matter, under these conditions, apparently fostered to a certain extent the development of this organism. After several days exposure it was noticed that there was a considerable change in the morphological characteristics of the bacillus as exhibited in

stained smears; the long granular, barred and clubbed-shaped types were transformed into short barred organisms, indicating that, while the bacteria were able to exist in this water, a progressive attenuation was taking place, which finally resulted in the destruction of the culture after nine days' exposure. The original morphological characteristics of the organism were, however, completely restored after several transplantations on blood serum of cultures transferred from the sacs before the ninth day. The results of these experiments were particularly striking and the work was repeated later with practically the same results.

The relatively short survival of the pathogenic organisms in distilled water—a few days only in most cases—was very probably due to the lack of food material; *B. coli* and the staphylococcus proving to be the most resistant of the group.

Comparing the effects of the diffusible constituents and by-products of the bacteria in the sewage, lake water and artesian well water on pure cultures of the pathogenic organisms, it appears that a solution such as the city water, containing a small amount of nitrogenous organic matter, exerted a less detrimental influence on the longevity of the bacteria than solutions rich in such matter.

The next series of experiments were undertaken for the purpose of ascertaining the effect of exposure of some of the pathogenic bacteria to the direct action of the organisms and their by-products, as well as the diffusible constituents, in sewage, lake water and city waters. The same method of arrangements and procedures mentioned in the first series were followed in these experiments, except that the solutions within the sacs were not sterilized before suspending them in the flasks. The permeable sacs were filled with the type of solution in which the sacs were suspended; the flasks were emptied and refilled with fresh liquid six times each day, and a study of each sac was made every day. In this manner the conditions which exist in nature relative to the exposure of pathogenic organisms in sewage and waters were approximated as closely as practicable.

In this series two strains of *B. typhi*, and one of *B. dysenteriae* were exposed to the sewage and lake water; and in the case of the city water, which had a low bacterial content, varying from 10 to 40 on gelatin, and one or two non-acid-forming organisms on agar, *B. diphtheria* and streptococcus were also exposed. The number of the organisms added to the solutions in the sacs varied with the richness of the original bacterial content. To the sacs containing sewage about ten million organisms of each type were added; the sacs containing the other solutions were respectively inoculated with approximately one hundred thousand bacteria of each type.

As the organisms in this series of experiments were in direct contact with the bacteria of the sewage and the waters, it was necessary to employ

differential methods of cultivating *B. typhi* and *B. dysenteriae*. For this purpose, lactose bile and Conradi-Drigalski agar was used for the presumptive detection of these two organisms.

The method of isolating *B. typhi* consisted in inoculating lactose bile with 0.1 of a cc. of the solutions transferred from the sacs, and after twenty-four hours' cultivation of the bile tubes at 37.5 degrees centigrade, cultures were made on D.-C. medium. In the case of *B. typhi*, several colonies exhibiting the microscopic characteristics of this organism on the D.-C. agar were fished, rejuvenated in dextrose broth, and confirmed by sub-culturing in milk, litmus lactose agar and peptone broth, and also by subjecting the culture to the agglutination test.

The same general methods of isolation were followed with *B. dysenteriae*. The colonies fished from D.-C. agar plates were rejuvenated in dextrose broth, and sub-cultured in milk, lactose broth and mannite broth for confirmation.

The streptococci were isolated from the city water by means of litmus lactose agar; the diphtheria organisms were cultivated on blood serum. About 0.5 of a cc. of the solutions was removed from the sacs and placed in tubes containing slanted blood serum, which were incubated at 37.5 degrees centigrade for twenty-four hours. A portion of the resulting growth was removed, smeared on a glass slide, stained with methylene blue, and examined microscopically. The character of the growth on blood serum and the microscopic examination were used as confirmatory tests for this organism.

The result of this series of experiments are tabulated below, and show quite plainly the differences in the vitality of the same and different organisms in the solutions of varied composition.

It appears from a comparison of the results summarized in Table 2, that the longevity of the pathogenic organisms varied considerably according to the bacteriological content and the chemical composition of the liquid environments to which they were exposed; the hard city water, with its low nitrogenous organic content, appeared quite conclusively to be less detrimental to the growth of the typhoid and dysentery organisms than either the sewage or lake water.

The results indicate that sewage is relatively quite destructive to the infectious bacteria; it evidently was the most unfavorable of the three liquid environments, as a rapid destruction of the introduced germs occurred in the course of a few days. Strain "B" of the typhoid organisms appeared to be somewhat less susceptible to the inhibiting influence of sewage than strain "A," and to possess about the same power of resistance as *B. dysenteriae*. The typhoid organisms died in from three to five days. No recoveries were made after the fifth day; and *B. dysenteriae* disappeared before the seventh day. It appears from a comparison

TABLE 2.

LONGEVITY OF THE ORGANISMS EXPOSED TO THE DIRECT ACTION OF THE BACTERIA IN SEWAGE, LAKE WATER AND CITY WATER, AS WELL AS THE DIFFUSIBLE CONSTITUENTS OF THE LIQUIDS.

Solutions contained in flasks.	Days exposed.	Bacteria exposed.					Controls.
		B. typhi "A."	B. typhi "B."	B. dysenteriae.	Streptococcus.	B. diphtheriae.	
Sewage . . .	1	+	+	+			—
	2	+	+	+			—
	3	+	+	+			
	4	—	+	+			
	5	—	+	+			
	6	—	+	+			
	7		—	—			
	8		—	—			
	9		—	—			
Lake water .	1	+	+	+			—
	3	+	+	+			—
	10	+	+	+			
	11	+	+	+			
	12	—	+	+			
	13	—	+	+			
	14	—	—	+			
	15		—	+			
	16		—	+			
	17			—			
City water .	1	+	+	+	+	+	—
	2	+	+	+	+	+	—
	3	+	+	+	+	+	
	4	+	+	+	+	—	
	5	+	+	+	+	—	
	17	+	+	+	+		
	18	+	+	+	+		
	19	—	+	+	+		
	20	—	+	+	+		
	21	—	+	+	+		
	22		+	+	+		
	23		—	+	+		
	25		—	—	+		
	26		—	—	+		
	30			—	+		

of these results with corresponding data in Table 1, that the diffusible substances of the sewage exerted a somewhat harmful action on the bacteria; but it is quite evident that the active destructive agents were the antagonistic sewage bacteria.

The longevity of the organisms exposed to lake water was materially increased, however, in comparison to their viability in sewage. The typhoid organisms were able to survive in lake water for twelve days, while *B. dysenteriae* was isolated as late as the sixteenth day after inoculation. The viability of the two strains of *B. typhi* appeared to be approximately

the same, strain "A" disappeared from the water in about eleven days and strain "B" was not recovered after the thirteenth day. It appears from an inspection of the data that the lake water, with its moderately high nitrogenous organic and bacterial content, is less destructive to the pathogenic organisms than the highly polluted sewage.

Of the three liquids to which the bacteria were exposed, the city water retained viable organisms the longest; a comparison of the results shows that the germs persisted for an appreciably longer time in this water than in either the sewage or lake water.

There appears to be some variation in the longevity of the typhoid organisms in this set of experiments. The difference, however, in the length of time, four days, that the strains "A" and "B" were able to resist the destructive influences of similar environments is within comparatively narrow limits, and, as the variations in viability noted in the other two sets of this series are relatively small, no definite conclusion in regard to this point can be drawn, although in all this work strain "A" appeared to be slightly more susceptible to the unfavorable influences of the liquids than strain "B."

The dysentery organisms were recovered from the city water as late as the twenty-third day; a period of activity, relatively, considerably longer than in either lake water or sewage. The streptococci remained viable throughout the period; apparently the conditions in the water were more favorable to the growth of the streptococci than to any of the other germs, at least, this organism possessed the power of resisting the inhibiting influence to a much greater extent than the other forms.

In general, it appears from an analysis of the results of this series that polluted waters are much more destructive to the pathogenic organisms than relatively pure ones. It is quite evident from an inspection of the above table that the bacteria were able to survive for a much longer time in the city water, with its low bacterial and organic content, than in either of the other liquids.

CONCLUSIONS.

The pathogenic organisms exposed to sewage, lake water and artesian water showed a difference in viability in the same and in the different solutions. There does not appear, however, to be a very appreciable difference in the powers of resistance of the two strains of *B. typhi* under the conditions of the experiments.

The diffusible substances and by-products of the bacteria in the sewage and waters to which the pathogenic bacteria were subjected exerted an inhibiting influence on their growth, slight in the case of the artesian city water, with its low organic and bacterial content, but more marked in the polluted lake water and sewage.

Where the pathogenic organisms were exposed directly to the action of the bacteria of the sewage and waters, their longevity was considerably decreased, indicating that the antagonistic action of the bacteria of the sewage was more detrimental to the viability of the pathogenic organisms than the inhibiting influence of the diffusible substances.

In general, the data supports the conclusion that the longevity of the typhoid and related organisms is much shorter in waters highly polluted with nitrogenous organic matter and saprophytic bacteria than in waters of good quality containing small quantities of nitrogenous organic matter and low bacterial contents.

SECOND REPORT OF THE COMMITTEE ON COLD STORAGE.

Presented to the American Public Health Association, Colorado Springs, September, 1913.

In the first report of the Committee on Cold Storage there were twelve suggestions offered which, it was recommended, "in considering the question of regulation or legislation on this subject the committee believes . . . should be carefully borne in mind." Many of these suggestions we still believe should be so considered. Other of these suggestions are intended more for the guidance of the warehouse operator than for the legislator or administrative officer. We would therefore like to amend our first report so that we may not be understood as recommending legislation or official regulation along all the twelve lines suggested, but as offering some of the suggestions for the guidance of the cold storage warehouseman.

Some slight modifications are proposed to some of the twelve suggestions referred to as offered in our first report. Item 4, as submitted in report No. 1, suggested: "No article of food should be placed in cold storage which is not mature, fresh, free from disease or deterioration of any kind." It is obvious that the intent of this suggestion was to provide that food placed in cold storage should be in prime or the best possible condition for such food. It has been pointed out to the committee that some foods are best stored in an immature condition and that such articles as cheese, for instance, mature best while in cold storage. Suggestion 4 is therefore amended to read: "No article of food should be placed in cold storage which is not mature, fresh, free from disease or deterioration of any kind, or in a condition such that, if kept under proper cold storage conditions, it will be, when removed, wholesome and suitable for use as a food."

Some criticism has been received of suggestion No. 10, which reads as follows: "It is desirable that frozen cold storage food products be raised gradually to higher temperatures, varying according to the size and nature of the article of food, in order to preserve the tissues in their natural condition." It is pointed out that this suggestion does not meet with the present practice of handling frozen goods in many cases. The criticism presupposes that the frozen articles of food are to be raised gradually in temperature in each instance by the warehouseman. The committee desires to explain that it did not have in mind the method or the medium by which the end suggested should be brought about. In many cases, perhaps a large majority of cases, the warehouseman will, because of his facilities, be called upon to gradually raise the temperature of frozen foods before prospective consumption, while in other cases the retailer or even the consumer will be in a position to do this. The point which the com-

mittee wished to emphasize by this suggestion No. 10 is that such a procedure will, in the case of frozen foods, preserve the tissues in their natural condition, which is certainly desirable.

Suggestion No. 11 in our first report perhaps needs some little explanation. This suggestion reads as follows: "Articles of food should not be returned to cold storage which have once been released and raised to materially higher temperatures. When it becomes necessary to transfer food products from one cold storage warehouse to another the temperature should not be allowed to rise to a point favoring deterioration." In the distribution of foodstuffs, it will often happen that goods taken from cold storage may not be sold or consumed on the day they were removed. A strict interpretation of the above suggestion would prevent the return of such unused portions to the cold storage warehouse. The committee believes it to be inadvisable to return such unsold or unconsumed foodstuffs to cold storage for any extended term. If the material is still in good condition there can be no objection to returning it to the cold storage warehouse for temporary storage so that it can be disposed of on the next business day. Such foods should be carefully watched to see that they have not become unwholesome as a result of their exposure to higher temperatures.

In other respects, the committee sees no reason to modify or explain the suggestions contained in its report No. 1. (See appendix.)

During the year there has been a great deal of proposed legislation in a large number of states. Wherever possible we have gotten in touch with the introducers of the bills, sending a copy of our first report and offering assistance. In a few instances our offers were acknowledged and our suggestions requested. In the bills actually enacted we see little evidence of the legislators using any of the suggestions offered. Pennsylvania, North Dakota and Iowa have passed cold storage bills. Ten other states have bills pending, some of which may have since been passed, information to that effect not having reached us.

The committee believes that in all this legislation too much attention is being paid to the question of the length of time which various food products may remain in cold storage. The important point from a public health standpoint, as well as an economic one, is—are the foods wholesome when placed in cold storage and are they in like condition when removed. Such scientific investigation as has thus far been made is not sufficient to say that any given food will remain good in cold storage for a given number of months and beyond that will be unfit for food. Nor do these investigations support such time limitation legislation. The two important points which this committee would urge with all emphasis are: first, that foodstuffs be in proper condition when placed in cold storage; and, second, that foodstuffs not intended for immediate consumption be placed in cold storage at the earliest possible moment.

It seems axiomatic to say that a food unfit for consumption because of decay or disease will not be improved by a few weeks' or a few months' sojourn in cold storage. On the other hand, it can be asserted with little fear of contradiction that under optimum cold storage conditions, foodstuffs in good condition when placed in cold storage will remain so for long periods of time. The enormous waste of food products every year is due to the lack of a sufficient number of warehouses at points of production and to carelessness or inattention on the part of producers to the necessity for prompt cooling, and not to anything inherent in the cold storage process itself.

Your committee has given much thought and study to this latter phase of the subject. What is to be the future development of the cold storage business? We have considered this question along three lines, as follows:

- 1st. Scientific and Mechanical.
- 2d. Economic and Financial.
- 3d. Educational and Illustrative.

SCIENTIFIC AND MECHANICAL.

There can be no doubt that any large development of refrigeration must depend upon the use of machinery wherein every law of mechanics and physics is to be utilized as far as possible to the making of methods effective and cheap. The development of the whole subject for forty years has primarily depended upon improved application of these laws to refrigeration from a business standpoint.

ECONOMIC AND FINANCIAL.

What has and will yet more develop these methods is the general distribution of hydro-electric energy to towns and rural districts, and the use of exhaust steam for refrigeration purposes. When small, mechanically cooled storage plants of from two to three horse-power can be installed for \$500 to \$700, run by electricity, it is plain that the economic use of refrigerating machinery has come within the limit of use of every shop-keeper who ought to be entrusted with taking care of and selling food products. Of course the large warehouses today illustrate the enormous possibilities of cold storage, of which the International Congress of Refrigeration, meeting in Chicago next week, is the concrete expression.

Your committee cannot fail to realize, however, that the application of refrigeration methods now generally made use of in the breweries, on the very premises where the product is made, and in the abattoirs, where the animals are killed, illustrates the scientific principles underlying cold storage which must under governmental license and supervision become universal in their application.

The very delicacy in composition and flavor of milk, eggs, and butter

and many fruits demands that the methods of a pre-scientific age be no longer tolerated, but that intelligent regulations, with inspection and encouragement through education, be gradually brought to bear upon every handler of food from the farmer to the small store-keeper.

EDUCATIONAL AND ILLUSTRATIVE.

From the making of yeast to the last moment any food supply was consumed, the housewife of the olden time had to depend, at every stage, upon the care of those very changeable organic products if their conservation was to be possible. The egg peddler, the local butchers, bakers, and cheese-makers have broken down that fine old farm dairy system, while the local butchers, bakers and grocers have become simply transfer men largely from the city butcher shop, bakery and grocery to the consumer.

If the problem of cold storage is to approach solution, the producer, that is the farmer, must relearn how to conserve his food products. He must be taught, and the housewife must be taught, by demonstrations and lectures, that, in place of the old cool milk cellar with running water, how easily and cheaply their food products may be conserved with the ice house, refrigerator or even the small mechanical refrigerator.

When 20 per cent. of eggs reaching city warehouses is the usual average of candled eggs found unfit for cold storage, it is apparent that present methods are in no small degree factors, not alone in deteriorated food products, but in the excessive prices due to scarcity of supplies. Nowhere in the world is this scarcity today being so acutely felt as on the North American Continent, and nowhere may the general use of machinery and electricity or correct methods be more readily taught or more easily be brought into general practice.

With such methods instituted at the farm, the local cold storage at railway points, where produce is collected for shipment, is the natural complement.

The preservation of the food supply of the country being thus provided for systematically as a part of the routine of production, the ability to hold supplies in perfect condition at local points in quantities, making large shipments possible, would prove to be of all means the best regulator of the distribution and price of products. The farmers and local dealers' helplessness in the matter of holding supplies is counted on too often by buyers to depress or regulate local prices, often to a point where the producer, not being paid for his labor, either becomes indifferent to quality or ceases producing altogether.

It is illustrative of what many will have observed in connection with all proposed acts to regulate cold storage that the whole idea underlying the legislation is that there can be cold storage facilities only in the large centers, where great quantities of food are accumulated in warehouses, as

during the seven fat years of Joseph's premiership in Egypt preparatory, as it were, either to seven famine years or to war.

The suggestions contained in the report of your committee indicate quite different views of the needs of the situation, and we trust that their presentation herein may serve to impress not only on the members of this Association the dominating importance of refrigeration as a public health problem, but also to indicate to the producers, whether fruit growers, meat raisers, fishermen or what not, that the solution of the problem lies antecedent to those great centralizations of food which legislators are in some degree trying to regulate.

The committee gratefully acknowledges the suggestions and assistance extended by the Association of Refrigerating Engineers, the Cold Storage Warehousemen's Association, and the editors of *Ice and Refrigeration*.

Your committee respectfully recommends that the investigations which have been undertaken be continued through this or a similar committee.

Respectfully submitted,

DR. WARD L. BEEBE.

DR. PETER H. BRYCE.

DR. HIRAM BYRD.

DR. W. F. SNOW.

F. D. BELL, *Chairman*.

APPENDIX.

Below will be found the twelve suggestions recommended in our first report, revised and amended as proposed in our report No. 2.

In the operation of cold storage warehouses and in any discussion of the question of regulation of, or legislation on, cold storage, the committee believes the following suggestions should receive very careful consideration:

1st. "Cold Storage" should be deemed to apply to any process for maintaining food for human consumption at such temperatures as will maintain it in its highest state of wholesomeness.

2d. The term "cold storage building" or "warehouse" should be deemed to apply to an establishment employing refrigerating machinery or ice for the purpose of refrigeration, or a room or building otherwise artificially cooled.

3d. The term "article of food" as used in cold storage regulations should be interpreted to include all articles of food, animal or vegetable, for human consumption, requiring any regulation of temperatures for their efficient sanitary preservation.

4th. No article of food should be placed in cold storage which is not mature, fresh, free from disease or deterioration of any kind, or in a condition such that, if kept under proper cold storage conditions it will be, when removed, wholesome and suitable for use as a food.

5th. It is essential that all foods possessing a temperature favoring some degree of deterioration should be cooled to a proper temperature as rapidly as possible with a view to maintaining it in its natural condition of freshness.

6th. After placing in cold storage it is essential to successful storage that the temperature and humidity found best for each particular food be maintained as evenly as possible.

7th. It is further essential that, with certain types of food products, circulation of air be maintained in the cold storage warehouse, and that an adequate amount of fresh cooled air be introduced each twenty-four hours; or, that the circulation air be passed through some solution depriving it of the volatile emanations of the food.

8th. Every storage warehouse should be constructed of such materials as will not cause organic emanations and in such a manner as will facilitate maintenance in as good sanitary condition as is maintained in the most modern plant employing the most modern methods for the preparation and handling of perishable food products.

9th. The periods of time during which food products should be allowed to remain in cold storage should depend upon their original freshness of condition, the continued maintenance of their optimum cold storage conditions and upon the results of further investigations on each class of food products.

10th. It is desirable that frozen cold storage food products be raised gradually to higher temperatures, varying according to the size and nature of the article of food, in order to preserve the tissues in their natural condition. (This may be done by the warehouseman, the retailer or the consumer.)

11th. Articles of food should not be returned to cold storage which have once been released and raised to materially higher temperatures. When it becomes necessary to transfer food products from one cold storage warehouse to another the temperature should not be allowed to rise to a point favoring deterioration. Articles of food removed from cold storage for consumption or sale and which, at the close of the day, remain unconsumed or unsold, may be returned, if in a wholesome condition, to the cold storage warehouse for temporary storage.

12th. In order both to maintain cold stored foods in the best condition possible and to preserve the credit of cold storage methods, it is essential that municipal control of foods placed in retail stores for consumption be of the most practical and scientific character.

HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS.

Augusta, Georgia.

Dr. E. E. Murphy presents his usual interesting report of the work of the Board of Health of Augusta during 1913. Augusta is a city with the usual southern problem of maintaining a generally healthy condition in the face of a large colored population which has no knowledge of or regard for sanitation and whose physicians are usually not as well trained as their white colleagues.

Augusta spends about fifty-four cents per capita on health work but has a general death-rate of 17.0 notwithstanding, and is unable to even reduce the white death-rate to any great extent on account of the negro element of the population as a potential fountain of infection. Of the total population of 51,000, it is estimated that 27,400 are white and 23,600 colored and the death-rates are: White, 13.7, colored, 20.0. Lack of complete reports of disease from the colored population are probably an added problem since the birth-rates (white, 21.3, colored, 9.8) are apparently incorrect. From figures given in the report of vital statistics, the table of death-rates per 100,000 is computed:

During the past year the deaths of children under five years has been reduced from 221 in 1912 to 165 in 1913, a reduction which Doctor Murphy attributes to an improvement in the

Cause of death.	White.	Colored.
Tuberculosis.....	87.6	233.0
Cancer.....	76.7	38.1
Pellagra.....	32.8	55.9
Malaria.....	11.0	38.1
La grippe.....	11.0	46.5
Pneumonia.....	124.1	262.3
Enterocolitis.....	91.3	55.0
Nephritis.....	168.6	304.6
Diphtheria (case rate).....	157.0	8.5
Smallpox (case rate).....	7.3	88.8

milk supply. Oiling for mosquitoes has been done on a larger scale during the past year and malaria has been reduced from 21 deaths to 9.

Recommendations for the coming year include the employment of district nurses for visiting cases of tuberculosis, the establishment of a tuberculosis camp, the building of several incineration plants for garbage throughout the city, the employment of additional inspectors of school children, and of an inspector for restaurants and groceries who is to be preferably a woman.

The report would be improved by the introduction of the international system of classification of deaths in place of the unstandardized alphabetical arrangement now used.

Summit, New Jersey.

Mr. Max J. Colton, former health officer of Summit, presents a very interesting report of the work of the health department of that city for the year of 1913. It presents the work in a very instructive and readable manner and is far better than the reports of many larger cities.

Although Summit had a population estimated as being only 9,300 in 1913 it is one of the New Jersey cities which have been leaders in public health progress and employs a full time health officer and registrar of vital

statistics and also a plumbing and sanitary inspector and a clerk. The expenditures of the Board of Health for 1913 were about \$3,800 or about forty cents per capita. The value of this expenditure is plainly shown in the low death- and disease-rates, the excellent condition of the milk supply and elsewhere.

Among the various features of the past year's progress may be noted the moving of the office of the board to newer and roomier quarters and the establishment of a laboratory for the diagnosis of diphtheria, typhoid,

tuberculosis and malaria, as well as for the examination of milk and water. Clean-up week was successfully introduced with the aid of the school children and the Town Improvement Association. Public health instruction is carried on through the aid of one of the local papers which gives space each week for health department news and by a bulletin board where notices and other material are posted. Cards containing a list of health rules were also distributed to the school children.

Believing that the methods of disinfection after tuberculosis were not adequate as carried on, Mr. Colton sent out a questionnaire on methods to other cities and has issued the following recommendations:

1. Notify all owners of houses in which there is located cases of tuberculosis and make it compulsory for them to report to us in case of a removal.

2. Upon the removal of a patient the room or rooms occupied shall be thoroughly washed with hot water and soap. This shall include all woodwork, furniture, etc. If in the judgment of the Health Officer the walls need a more thorough disinfection than can be accomplished by fumigation, they shall be sprayed with a disinfectant. The rooms shall be thoroughly aired and dried before being used again.

3. Upon the death of a tubercular person

the room or rooms shall be fumigated with formaldehyde. After that the entire premises shall be gone over and determined what further steps are necessary. This shall consist of thoroughly washing all woodwork, furniture, etc., with hot water and soap. The rooms that are papered should be given the same disinfection as after the removal of a patient. All material which cannot be made safe by disinfection shall be burned. The room or rooms shall be thoroughly aired and dried before being occupied again.

4. Disinfection shall be performed as heretofore, free of charge. The washing of the rooms shall be performed by the owner of the house or the tenant living in such house at the time of the removal or death of the patient, under the supervision of the Board of Health.

The milk supply is carefully controlled and appears to be in excellent condition; repeated inspections accompanied by instruction have brought about the following improvement in average dairy scores for the twenty farms supplying milk to the city. 1910, 66.50, 1911, 72.79, 1912, 77.94, 1913, 80.17. It is to be noted also that since 1910 only one death from diarrhea among children under five has occurred each year.

During 1913 the plumbing inspector acted as registrar of vital statistics and presents an excellent report.

DEPARTMENT NOTES.

Public Health Survey, Topeka, Kansas.

The investigations made by the Department of Surveys and Exhibits of the Russell Sage Foundation of the sanitary conditions of the various cities of the United States have had a profound influence in stimulating health work all over the country. Studies of this sort have been made by Mr. Franz Schneider, Jr., of the Department of Newburg, N. Y., Newark, N. J., and Atlanta, Ga., and other cities.

The report on the conditions in Topeka, Kansas, made by Mr. Schneider to the Topeka Improvement Survey Committee, has just come to hand, and this last report

seems to the reviewer the best thing in this line that has yet been accomplished anywhere. The report takes up in detail conditions regarding life, death, and disease in Topeka; analyzing statistics in detail by wards.

Then follows a detailed discussion of sanitary conditions, water supply, sewage disposal (including an investigation of the condition of sewers themselves by Professor G. R. Jones of the State University), milk supply, food supply, wells and privies, and such special problems as tuberculosis, infant mortality, venereal diseases, housing, refuse disposal, and the physical examination of

school children. This section of the report is very fully illustrated by a most admirable series of photographs of local conditions; many of the pictures being destined to furnish classic examples for lectures and discussions of the topics in question.

Mr. Schneider then proceeds to analyze the organization and budget of the Department and to make specific recommendations as to the need for a properly qualified full-time health officer, and for radical improvement in the system of milk and food inspection; the extension of the work on communicable diseases, and the institution of comprehensive campaigns against tuberculosis, infant mortality and venereal diseases. He also emphasizes the need for organized work in public health education.

This report would be of value to all municipal health officers as a check upon the efficiency of their work.

C.-E. A. Winslow.

Coöperative Health Administration among Small Communities.

There is today in the practical public health field no more vital problem than how small towns and cities can, with their limited resources, obtain the expert health service which they require. One promising move toward a solution has been made in the recently adopted New York State plan by which a greater degree of supervision of state over local authorities is established. But, while this is still in the inceptive stage, a searching trying-out of the possibilities of coöperative maintenance of a joint health office has been going on in a group of Massachusetts towns. The successful results obtained in this experiment, the first noteworthy one of its kind, are reported in a paper by Earle B. Phelps in a recent number of *Public Health Reports* and summarized as follows:

"The local health office in the smaller communities is the most essential and least efficient part of the present-day public health machine. The highly specialized character of public health work and the financial inability of the smaller community to support a properly trained health organization

are in large measure responsible for this condition.

"Consolidation of adjoining communities in a coöperative health office will provide a sufficient population to support the requisite minimum organization for efficient health work at a per capita charge much less than that usually imposed in the larger cities for work of a similar character.

"The details of such a coöperative effort inaugurated among certain Massachusetts towns by the officers of the department of biology and public health of the Massachusetts Institute of Technology are given.

"This work was assisted by the Surgeon General of the United States Public Health Service through the detail of a sanitary bacteriologist and through the devoting of a portion of the writer's time to the general supervision of the work since October 1, 1913.

"An organization comprising an administrative officer, a bacteriologist and secretary, a sanitary and plumbing inspector, a field assistant, and two clerks served a population of 32,650 in all departments of the work except plumbing inspection (a population of 8,385 being served) and an additional population of 30,000 in milk inspection and control, at a cost of \$7,603.51 for the year.

"The output of such a health office can be increased by the appointment of assistants at less than a proportionate increase in maintenance costs.

"The prompt measures taken in the preliminary investigation of every case of contagious disease, backed up by the findings of the diagnostic laboratory, have, in at least two cases, prevented serious outbreaks of contagious disease and would undoubtedly have prevented a third outbreak and one death had they been in force in a neighboring town from which a carrier case was imported.

"The average bacterial content of the milk supply has been reduced by approximately two-thirds without any restrictive measures having been imposed upon the producers themselves other than those already in force. This has been done by a systematic laboratory control of the milk supply embodying monthly chemical and bacterial analyses, by a policy of publicity, and by helpful,

constructive criticism given to the producers upon request. The improvement is of especial significance in view of the generally good quality of the milk supplies in question. Starting with 32 per cent. of the individual supplies below 10,000 bacteria per cubic centimeter and 50 per cent. below 20,000, one year later 31 per cent. were below 5,000, 56 per cent. below 10,000, and 74 per cent. below 20,000.

"Prompt and energetic measures were adopted in the control of contagious diseases, every effort being made to locate the initial source.

"Campaigns for mosquito and fly suppression were carried through successfully.

"An accounting system, showing full details of the costs of this work, was employed. The work of the diagnostic laboratory and the milk inspection and control cost approximately 3 cents per capita per annum each, and the work of sanitary inspection and control of contagious disease cost slightly more. The total cost of the work, exclusive of plumbing inspection, was 19 cents per capita per annum.

"A population of about 60,000 would develop each of the various subdivisions of the work to a point of maximum efficiency and could support the work of a complete organization, including two district nurses and medical and veterinary advisory services, at a per capita cost (exclusive of plumbing inspection) of one-half the average cost of board of health work in the large cities of the United States.

"Such a coöperative office may be organized among the towns themselves, through the initiative of State or educational authorities, or under the direction of a consulting sanitarian, or it may be conducted entirely by an outside consulting office specializing in public health work."

The equipment and duties of a local health office, the problems of local administration, and the minimum requirement of such an office are discussed at some length, and the year's work under a permanent organization is reported upon in detail, with analysis of costs. Appendices giving the form of agreement adopted and a list of the necessary

laboratory equipment for a small board of health laboratory are added.

Such a coöperative plan, it may be added does not necessarily imply the consolidation of town interests in any other respect than that of public health, or even complete consolidation in that.

This important paper is printed in *Public Health Reports* for September 25, 1914, copies of which may be obtained from the United States Public Health Service, Washington, and should be carefully read by all health officers and others interested in local health administration, for its analysis of needs and methods as well as for its account of the coöperative plan.

Putting a Stop to Bathing in Sewage.

One of the problems of a large city like New York, is to provide suitable bathing places where particularly the poor of the city may enjoy the refreshing benefit of a bath during the hot weather. The following clipping taken from *Survey* for July 25, 1914, outlines the method taken by the New York City Health Department.

"In many quarters the stand against New York city's encouragement of bathing in polluted river waters has been crystallizing. The last of March an order was issued by Commissioner Goldwater, of the Health Department, forbidding the use of the floating baths within a danger zone bounded by the Narrows, the waters of the Hudson and Harlem, and East River below the Bronx Kills.

"Immediately the owners of private river baths, entrenched behind city permits and leases, raised a hue and cry. In deference to their protests a hearing was held by the Health Department.

"Following this, the order of the Health Department was somewhat modified. An amendment to the sanitary code granted permission to continue river bathing, public and private, provided that the hitherto more or less complete enclosures of river or harbor waters be made entirely water tight; that no river or harbor water be used unless purified; that persons suffering from communicable diseases be excluded and that all bathers be

required to use a shower bath before entering a pool.

"In order that the million and a half bathers who enjoyed river bathing in the floating baths last summer may not be deprived, the Bureau of Public Buildings and Offices of the Department of Public Works, at the request of the borough president, has arranged to remodel six of the public floating baths so that they will be water-tight. Into these Croton water will be introduced. Salt may be added.

"One hundred and twenty-seven sewers empty into the Harlem and East Rivers, and sixty-two empty into the Hudson from Manhattan alone. Chemical and bacteriological examinations have repeatedly shown the water to be highly polluted. The 500,000,000 gallons of sewage daily discharged into the waters surrounding Manhattan face the further unhappy prospect of some 150,000,000 gallons of the Passaic Valley sewage from New Jersey soon to be added daily to the waters of New York."

Following Up Malaria Cases.

To make the line of defense against malaria more complete, Charles F. Mason, Chief Health Officer of the Canal Zone, has had the following notice posted prominently throughout the district:

"1. Patients suffering from malaria often retain the germ of the disease in their blood after all the symptoms have disappeared, so that they are apparently well. Such cases are a danger to the community, in that they infect the mosquitoes and through them other people. Besides this, such cases are not permanently cured and will relapse whenever their resisting power is lowered from any depressing cause.

"2. As patients naturally do not desire to remain in hospital after they feel well enough to work, it is necessary that they should continue under treatment in quarters until they are permanently cured. It is, therefore, directed that employees suffering from malaria shall, when discharged from the hospital, report to their district physician for treatment, and shall continue to report for

treatment for at least one month and until pronounced cured.

"3. Any employee who wilfully fails to comply with this regulation shall be suspended without pay, or be discharged from the service.

"4. Heads of departments and divisions, hospital and district physicians, foremen and others concerned, are directed to do all in their power to assist in enforcing this order."

A similar measure would be desirable in many parts of this country but would be difficult to enforce since even at the Isthmus with its fairly rigid government control it is found that many of the lower class of laborers fail to report as directed.

Canal Zone Health Department.

The *Canal Record* of August 12 publishes the following order, just issued by Governor Goethals of the Canal Zone, providing for the future organization of the Health Department:

"1. The Health Department, under the supervision and direction of the Chief Health Officer, is charged with all matters relating to maritime sanitation and quarantine in the ports and waters of the Canal Zone, and in the harbors of the cities of Panama and Colon and with land sanitation in the Canal Zone, and sanitary matters in said cities, in conformity with the Canal Treaty between the United States and the Republic of Panama, and existing agreements between the two Governments thereunder, and all matters relating to hospitals and charities.

"2. The Health Department is subdivided, as follows: (a) Division of Hospitals and Charities, (b) Division of Sanitation, (c) Division of Quarantine.

"3. The Division of Hospitals and Charities is under the direct supervision of the Chief Health Officer. Included in its jurisdiction are such hospitals as may from time to time be established in the Canal Zone, the Santo Tomas Hospital in the city of Panama, such institutions as the Palo Seco leper asylum, the Corozal farm, and any other institutions that may be established by proper authority, and such dispensaries as are or may be found necessary.

"4. The Division of Sanitation includes the Division of Zone Sanitation and the health offices of the cities of Panama and Colon:

"(a) The Division of Zone Sanitation is under the direct charge of the General Inspector, who will perform the duties heretofore assigned to the Chief Sanitary Inspector and to the General Inspector. He shall have direct charge, management, and control of all work performed or entered upon within the Canal Zone for the prevention or suppression of diseases. He shall be charged with the duty of securing the enforcement of all sanitary regulations, and perform such other duties appertaining to his position as may be required by the Chief Health Officer or the Governor of The Panama Canal.

"(b) The Health Officer of the city of Panama, under the supervision and control of the Chief Health Officer shall enforce the sanitary rules and regulations in force in said city, and shall perform such duties as may be prescribed by law, and also such other duties appertaining to his office as may be required of him by the Chief Health Officer or the Governor of The Panama Canal.

"(c) The Health Officer of the city of Colon, under the supervision and control of the Chief Health Officer, shall enforce the sanitary rules and regulations in force in said city, and shall perform such other duties as may be prescribed by law, and also such other duties appertaining to his office as may be required of him by the Chief Health Officer or by the Governor of The Panama Canal. His territorial jurisdiction shall extend to and include the municipality of Cristobal, in the Canal Zone, and such areas in the vicinity thereof as may be assigned to him by the Chief Health Officer.

"5. The Division of Quarantine shall include the quarantine stations of Balboa-Panama, Cristobal-Colon, and the quarantine inspection at Bocas del Toro. It shall be under the direct charge of the Chief Quarantine Officer, who shall have charge of the sanitation of the harbors and vessels lying therein, and shall see that such measures are enforced as are necessary for the proper hygiene of vessels, their cargoes and person-

nel, whether in port or *en route*, and to prevent the vessels from being a source of danger to other vessels or to the port; he is authorized to certify bills of health to vessels clearing from ports under his jurisdiction, setting forth in such bill of health the conditions of the port, vessel, cargo, passengers, and crew; he is authorized, at the request of the master of any vessel, to disinfect and otherwise place such vessel in a sanitary condition, so that it may leave the port in free *pratique*, and be able to make entry at the port of destination without further disinfection or detention in quarantine; he shall prevent the entry into the Canal Zone of any person whose presence would be a menace to the public health or welfare, or who would be liable to become a charge upon the public."

Coöperation Between City Governments and Universities.

In view of the discussions, held before the American Public Health Association in 1910 and reported in this JOURNAL, on the subject of coöperation between state boards of health and state universities, the following suggestion made by Professor Jeremiah W. Jenks of New York University, and taken from the October *National Municipal Review*, is of interest. The occasion was a recent conference in New York on the universities and training for public service. While the remarks bear specifically on city government, they obviously have a more general application.

"Beyond the work that may be done by professors and experts, it has been suggested that there may also be helpful coöperation on the part of advanced students. Beyond any question, graduate students who are fitting themselves for positions in public administrative work would be greatly benefited if, in addition to their lectures and reading, they could have some actual practice in administration. They would often be glad to secure this practice, either at no expense to the city, or for the payment of merely a minimum living salary while they are getting their training. If two students were to work together in this way, dividing the time between them,

they could arrange to take the work of one position in the city government, each receiving half-pay for his half-time work. If the positions thus filled were those that would give the students an insight into the principles of government and give them the opportunity for constructive work, it would be of great importance to them. Moreover, the city would doubtless be able to secure in this way a higher grade of work—properly supervised also by the university professor—than they would get from the ordinary employee. It is hoped that some plan like this can be worked out."

Classes for the benefit of city employees under civil service rules, clubs of graduate students for study of municipal problems, and civic information bureaus in connection with such clubs are also suggested.

Kentucky Health Officers' Conference.

That the preventable disease of typhoid fever costs the State of Kentucky more than the amount of money required to run the State Government, was brought out at the recent Health Officers' Conference in that State.

With the assistance of the United States Public Health Service a most vigorous campaign of education and treatment has been waged against trachoma especially in the mountainous parts of the State where its prevalence is most alarming.

The conference outlined plans for a thorough study of pellagra during the coming year. There are a number of cases in the State and one death has been reported in Louisville during the past year.

Prophylactic measures against the possible invasion of river cities by plague-infected rats from New Orleans were also advocated. All the State health officers were in favor of a war on rats.

Nevada Service Reorganized.

A recent circular announces the reorganization of the service in the State Hygienic Laboratory of Nevada. Since its founding in 1909 the laboratory has confined its activities almost entirely to the diagnosis of the more

prevalent infectious diseases, but now comes the announcement of a practically new department for "assistance in the prevention and control of communicable diseases within the State." "Scattering work" has been done heretofore along this line but arrangements have now been made to give this work special attention.

Stock vaccines will be distributed without charge and autogenous vaccines made up on occasion. Public water supplies will be analyzed free, sewage pollution investigated and recommendations for sewage disposal systems given. A specialty will be made of epidemiological problems, especially in regard to milk supplies.

All of this work will be free to the people of the State with the exception of traveling and other expenses of the collector or inspector when the services of such a person are needed.

Enforcing Sanitary Laws.

"What is true of laws in general is equally true of sanitary laws. Many so-called sanitary and public health laws now on our statutes are an obstacle to progress in preventive medicine. Many good sanitary laws are not enforced and cannot be enforced because public sentiment is not fully alive to the importance of preventive medicine. The natural result of this apathy is a withholding of proper authority and proper appropriations by means of which laws can be enforced. Hence, laws fail in their purpose. One of the greatest needs in efficient public health work in the United States is a national Department of Health, a great central educational institution for research, for information, for coöperation. There must be a well-organized national health department in which must center every function of the government in any way touching public health. The aid and coöperation of this department must be available to every citizen, every community and every city and state board of health in all public health problems, even as the aid of a national Department of Agriculture is now available to every farmer and every farming community."

Jour. Indiana State Med. Assn.

Midwifery in New York City.

In the July number of the *Monthly Bulletin* of the Department of Health of the City of New York there appears an article by Dr. Rosalie Bell on the work done in the supervision of midwives in New York City. Up to 1907 there was no supervision or investigation of the midwives. All that was necessary was to file a certificate of moral character and experience, properly signed, with the Registrar of Records, and the midwife was free to practise. For years this method worked successfully. But as the character of immigrants changed so did the type of midwife, and soon there were many wholly unfit women practising midwifery among the foreigners. Many of these women had little or no training in midwifery and the Department of Health decided that steps should be taken to supervise and control midwives.

The law of 1907, Chap. 432, gave the Department power to supervise and control midwifery, and in November, 1907, the Sanitary Code was amended to the effect that no midwifery was to be practised or no lying-in-hospital was to be conducted without permit from the Board of Health.

In 1909 the supervision of midwives was given to the Bureau of Child Hygiene. All known midwives were visited and asked to

call at the Department office and apply for a permit to practise. The application was signed and endorsed by two physicians and a layman and was sent to the Bureau of Child Hygiene. A medical inspector called on the midwife and made a thorough inspection and investigation. If conditions were found satisfactory the medical inspector signed the application and returned it to the Department. The midwife was then granted her permit for one year, together with a book of rules and regulations, and also a supply of silver nitrate solution to be used according to the rules. Monthly inspection by a Department nurse was made, and at the end of the year the same procedure was again gone through.

In 1913 there were 1,344 licensed midwives in New York City, largely from the midwifery schools in Europe. In 1911 a free training school for midwives under municipal control was established. The course given extends over six months and it gives a thorough training. Diplomas are awarded.

On January 1, 1914, a set of rules and regulations was adopted by the Board of Health, stating the general conduct of the schools, requisites for entrance, instruction and courses of study, and recognition of schools outside of New York City.

PUBLIC HEALTH NOTES.

Economic Causes of Disease.

The intimate relation existing between economic conditions and disease has been reemphasized by Surgeon-General Wm. E. Gorgas, who in a recent address in Cincinnati declared out of his own experience that poverty is "the greatest single cause of sad sanitary conditions." The solution, in his opinion, lies in the adoption of single-tax, through its effect in eliminating the poverty due to inequitable distribution of wealth. "Sanitation, in my mind, has been very closely associated with single-tax. . . . Sanitation is most needed by the class of people who would be most benefited by the single-tax."

The effect of such a tax reform in eliminating neglected property is another argument. "In a city such as Panama or Havana, the vacant lots and unimproved neighborhood were the localities which always gave us most sanitary trouble. I was soon convinced that if any scheme were brought about whereby it would be disadvantageous for speculators to hold vacant places out of use, this scheme would be of the greatest value for sanitation. . . . I discussed this method of taxation a good deal with the officials of Panama, urging upon them the desirability of a tax levy of this kind to cover expenditures brought about by the sanitary work. . . . I hope that something of the kind may yet come about in Panama."

Every health officer can testify as to the difficulties arising in connection with properties such as those described, and welcomes any light on methods of dealing more satisfactorily with them. Aside from the possible merits of the solution proposed, the remarks are suggestive and bring out anew the interrelationship of the public health movement with social and economic conditions, in the solution of which the Health Officer has a vital interest.

The Fly at the Bar.

Boards of Health, National, State, and local, have issued rules and warnings against

the house-fly, until "Swat the fly" has become a household injunction, although not always in such unconventional terms. We believe that it has remained for England to be the first to bring this domestic pest before the bar, and that this year he (or she) has for the first time been arraigned in court. A recent number of the *London Times* devotes a column to this, which may well become a standard case, to which reference will be made by judge and lawyer.

It seems that in a hamlet on the Thames a market gardener deposited stable manure on land adjoining the residence of a Mrs. Bland. This lady and her husband had the courage to test the right of the gardener to maintain a nuisance of this kind on his own premises. The courts held that while a disagreeable smell might not be cause sufficient to justify an injunction, the fact that flies breed in manure and might injure the health of neighbors was full justification for an order of restraint.

The case afforded an opportunity for rival experts to give partisan evidence. One of them for the defendant testified that the gardener managed this manure well, that it gave off only "quite an agreeable smell of ammonia." Of course he saw no flies! Another expert from the British Museum also testified for the defense that he did not see any flies on the gardener's premises, but found a swarm of flies on the porch, belonging to three or four different species, with no single house-fly. He admitted that house-flies bred in manure, but was unwilling to testify that the people in the house were justified in claiming a menace to health or even discomfort.

The judge stated that the complainants had proved that flies had been prevalent ever since the manure had been placed where it was, necessitating wire screens in the windows; that the flies came from the manure; that experts had discovered an abnormal number of flies, and that they were not only a discomfort but might be a menace to health; and, although he felt reluctant to interfere with the gardener's profitable industry, he

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felt compelled to grant an injunction restraining him from so handling his stable manure as to make possible the breeding of flies near adjoining premises, and he assessed the costs of the suit against the defendant.

Outlook, August 29.

Rural Sanitation.

"The following suggestions are offered as indicating hopeful lines of work:

"(1) The granges of the state offer the most attractive possibilities in this direction and a health officer could find pleasant and useful employment at their meetings.

"(2) There should be coöperation with the rural school superintendents and discussion of sanitary matters in the various schoolhouses.

"(3) Instruction may be given to the children of the country schools by their teachers after the latter have been properly posted by the health officer on the subjects upon which they should be informed.

"(4) The health officer can occasionally work with the pastor of the rural church, addressing the people on sanitary matters, on suitable occasions, at the church.

"In all these points the department of health is only in line with the tendencies of the times when it attempts to give to rural inhabitants the same advantages with regard to public sanitation which are enjoyed by the cities."

American Review of Reviews.

Bactericidal Floor Covering.

The *International Hospital Record* of August 25 contains the following note on linoleum as a sanitary floor covering, clipped from *Die Umschau* (Berlin):

"In testing for germs it is often found that such substances as stone, wood, porcelain, glass, etc., are sterile. A number of years ago Privy Councilor E. Fischer made the observation that on certain building materials disease germs quickly die. L. Bitter has shown that the very resistant staphylococcus perishes within one day on the surface of linoleum. As far back as 1901, Jacobowitz proved that the germ-killing effect of the

much-acclaimed 'disinfecting wall-paints' was due to the chemical effect of the linseed-oil used as a binding medium. Since the essential constituents of linoleum are cork and a large quantity of linseed-oil, its disinfecting capacity is not to be wondered at. But in the case of the disinfecting wall-paints the sterilizing power wears off in a few months because the linseed-oil dries, while linoleum has a lasting effect. Hence linoleum operates to kill the majority of the microörganisms brought in on the shoes. Frequent moistening accelerates this disinfecting property. Hence, all disease-germs which do not form spores quickly die on a linoleum covering which is wiped off daily with a damp cloth. According to F. Fritz this bactericidal power is due to certain chemical groups in the oil, especially lin-oxy-n."

A Scheme to Preserve Infant Life.

"A number of interesting proposals have recently been brought forward by the Women's Coöperative Guild for ensuring a better start for new generations by helping prospective mothers. The reforms suggested are: (1) To make the Notification of Births Act, now applied to about 60 per cent., compulsory for all the community. (2) To establish maternity centres, under the local authorities, for the organization of instruction and help. (3) To appoint municipal midwives. (4) To transfer maternity benefits from administration under the Insurance Act to the control of local authorities. It is estimated that an annual saving of 50,000 lives is being effected on our infant mortality-rate. It is variously estimated that out of the 25,000 blind people in this country, 60 to 80 per cent. have become blind from ophthalmia neonatorum, which is a curable disease if properly treated. Now that this is a notifiable disease, it is hoped that Public Health Authorities will take steps to bring the necessary relief. Quite recently the Bradford Town Council opened a model little hospital for the treatment of ophthalmia neonatorum and the operative and more expert treatment of the eye, ear, throat and nose. In an investigation of about 700 cases,

it was found by the London County Medical Officers that in nearly one-half, mental deficiency was due to pre-natal and birth conditions. Maternity and pregnancy sickness should be removed from the Insurance Act and placed under the Public Health Authority. It is suggested that a grant equivalent to £7 10s. for every child born should be made by the State to all mothers under the £160 income limit. The mother should draw £5 of this benefit. She might be given her choice of £1 10s. in cash at confinement, or if she employed the municipal midwife, £1 in cash and free midwife, the remaining sum to be paid in weekly instalments. The further sum, averaging £2 10s. per birth, would form a fund from which additional benefit might be given. The health and general welfare of its children should be the greatest asset of the community and ought to be its first care."

Journal of State Medicine, August.

Water Filtration for Detroit.

"Theodore A. Leisen, who has just assumed his new duties as the chief engineer of the water works of Detroit, Mich., states that the next great improvement needed in the system is a filtration plant, the cost of which, for the 200,000,000 gallons a day capacity required, he estimated at \$2,000,000 to \$3,000,000.

"Detroit is now using hypochlorite to some extent, but Mr. Leisen does not consider it a substitute for filtration, but rather as a supplementary treatment. He also recommends sewage purification for the city.

"Mr. Leisen comes to Detroit from the Louisville water works, of which he has been superintendent and engineer for several years, and he succeeds Geo. H. Fenkell, who was appointed commissioner of the department of public works some months since."

Municipal Engineering, July, 1914.

New Problems of Public Health.

The Prudential Insurance has recently published a pamphlet entitled "The Chances of Death and the Ministry of Health," by Frederick L. Hoffman. This was an address

delivered before the Yale Divinity School, March 30, 1914. The following is of interest:

"With the passing or control of the diseases which have become common knowledge, new ailments and afflictions cause new problems of serious importance, because the conditions of spread are either entirely unknown or but imperfectly understood. Influenza is one of these diseases, which, within recent years, appeared for the first time as a national scourge in 1891, causing directly or indirectly an enormous loss of life, and the disease has since prevailed to a more or less extent, either pneumonia, accounting for 6.1 per cent.; and cancer, accounting for 5.6 per cent. These six causes alone are responsible for 38.8 per cent. of the entire mortality. Other diseases, now largely under control but intrinsically as serious a menace to community life as any of those mentioned, are typhoid fever, smallpox, measles, scarlet fever, whooping cough, diphtheria, etc. The typhoid death-rate, which is typical of sanitary progress or neglect, has declined in American cities from an average of 51 per 100,000 of population during the decade ending with 1892 to 25, or just about one-half, during the decade ending with 1912; but our typhoid fever rate is still excessive and no cause of death perhaps illustrates better the lamentable amount of still existing municipal neglect. Tuberculosis, the foe of mankind for ages, the disease par excellence, considered a visitation of God, has, during the last generation, been brought within the range of human control, with a fair prospect that within a measurable period of time its ravages will be reduced still more than has been the case in the recent past. The tuberculosis death-rate of American cities during the decade ending with 1882 was 318 per 100,000 of population, but the rate during the last decade was only 182. Within more recent years the mortality from smallpox has been reduced from an average of 3.4 during the five years ending with 1905 to a rate of only 0.3, or about one-tenth of the earlier rate, during the year 1912. The mortality from the dread diseases of infancy, diphtheria and croup, has been reduced from an average of 29.6 during the five years ending.

"The conservation of human life and health, or, as said by Prof. Irving Fisher, the problem of life extension, is not only of economic, but also of great moral significance. The perfection of human character is, partly at least, conditioned by the maximum attainable duration of life, and old age is an essential to human development, moral and spiritual, as is the secular and religious education of youth."

The Duck as a Preventive Against Malaria and Yellow Fever.

The duck enters a new field of usefulness: namely, that of destroying mosquito larvæ, and consequently acts as an eradicator of mosquito-carried diseases. Samuel G. Dixon, M. D., LL. D., in the October 3 number of the *Journal of the American Medical Association* describes experiments which he conducted to demonstrate this fact. For this purpose he employed Mallard ducks and his reports testify as to their ability in this field of public health service.

After unsuccessful attempts in which fish were employed to destroy the larvæ, the stream where the experiments were being carried on was divided into two parts. Each portion covered an area of about 1,400 square feet. The conditions created were ideal for mosquito breeding. One pond was protected from the birds and was stocked with gold fish. The other pond was the feeding ground of the fowl for months. Mosquitoes flourished in the protected pond, while the unprotected one was entirely free from the insects.

Ducks were now introduced into the protected area. At first the varied food in the form of tadpoles tempted them; but inside of twenty-four hours they had rid the pond of pupæ; and in forty-eight hours only a few small larvæ remained. The author states that numbers of larvæ must have been drowned, due to the commotion of the water produced by the birds. Doctor Dixon says, "For some years I have been using ducks to keep down mosquitoes in swamps that would have been difficult and expensive to drain, but I never fully appreciated the high degree of efficiency of the duck as a destroyer of

mosquito life until the foregoing test was made."

As further proof of his belief and work Doctor Dixon points to the work of Howard, Dyar, and Knab, "Mosquitoes of North and Central America," advancing the theory that ducks destroy mosquito larvæ. Mr. William Lockwood, of Boston, an artist, expresses the same idea; while Mr. McAtee of the *Biological Survey* voices the same opinion.

Infantile Paralysis.

The July number of the *Journal of Infectious Diseases* prints the account of an unsuccessful attempt to transmit poliomyelitis by the bite of *Lyperosia irritans*, a blood-sucking fly often found in great numbers on cattle. Because of the successful transmission of the disease from monkey to monkey by *Stomoxys calcitrans* as reported by Roseneau and others it was natural that *Lyperosia* should be regarded with suspicion. Experiments were accordingly begun with this fly in August 1913 by Edward Francis at the United States Marine Hospital in Savannah, Ga. But, although the flies were allowed to feed alternately upon diseased and fresh macacus rhesus monkeys for several days, no transmission of the disease was thereby effected.

Cytology of Milk.

The study of the cellular content of milk is discussed at some length in the *Journal of Pathology and Bacteriology* for July, 1914, by G. S. Woodhead and P. C. V. Jones. Their careful investigations in this comparatively unexplored field demonstrated the existence of eleven types of cells in the lacteal fluid. Of particular interest to the sanitarian is the discovery of blood cells in normal milk. We quote their concluding paragraph:

"The presence of blood cells, sometimes in large numbers, in the milk is of special importance in view of the recent observations on the presence of the tubercle bacillus in the circulating blood of cattle. It would appear to explain the infective character of milk of tuberculous cattle in which not the slightest lesion can be found in the udder."

Septic Sore Throat and Infected Milk.

Additional information concerning an epidemic of streptococcus sore throat coincident with that which occurred in Chicago in the winter of 1911-12 is given in an article by J. A. Capps and D. J. Davis in the July issue of the *Journal of Infectious Diseases*. The Chicago epidemic, it may be remembered, was traced to one dairy and on its farms cases of mastitis in the cows and cases of sore throat among the milkers were discovered.

The coincident epidemic at Batavia differed from that in Chicago in that the disease spread among the users of the milk of dairies other than the one on which the only combination of sore throat and mastitis was discovered. The evidence seemed to show, however, that this one farm was the only source of infection and that the general spread of the disease was due to the exchange of milk bottles by different dairies through the medium of their customers and the use of these bottles again without sterilization.

Being thus led to believe the combination of mastitis and sore throat on the same farm to be good evidence of infected milk, the above-mentioned authors sought and found such a combination of conditions. And upon following this milk to its consumers in Oak Park they discovered that an epidemic of sore throat was undoubtedly resulting from its use.

The same authors also publish in the magazine mentioned the record of certain experiments to test out the relationship of sore throat and mastitis, which seemed to be caused by the same organism. It was found that streptococci of human origin, whether injected into the udder of the cow with a catheter or gaining entrance through the injured surface of the teat, would immediately cause mastitis and consequent infection of the milk although there might be no physical evidence of the disease. Nor were the cultural or pathogenic properties of the streptococci changed after growing in the udder of the cow for weeks.

- The Swimming Pool.

The July number of the *Journal of Infectious Diseases* takes up the problems of the swimming pool in an article by Wallace A. Manheimer in which the author gives an account of a detailed and extended study of the College, Association and Public swimming pools of the city of New York. We quote in part from the general recommendations which his investigations have led him to make:

"Pools should be constructed of smooth lining without crevices and should be of as large capacity as possible. There should be no obstructions of any kind in the water, a combination life rail and overflow ledge making this possible. Where feasible, the plunge should be constructed on the top floor so that the water used for flushing purposes could be taken from it. The fresh water usually employed for this purpose should be added to the pool instead. Each establishment should be provided with adequate shower baths and convenient dressing rooms and toilets.

"The water used in swimming pools should be pure. Where this is not possible it should be thoroughly purified before use by the methods indicated.

"The water should be thoroughly filtered before passing into the tank so that the opacity of the water could not obscure a submerged person.

"Refiltration is an efficient and economical method of keeping water clear during protracted use.

"Calcium hypochlorite, used in amounts controlled by appropriate test, has been shown to be efficient for the disinfection of swimming pool water and in conjunction with refiltration is urged as the most effective method of pool sanitation.

"Students and patrons should be subjected to physical examination before entering the plunge, and all diseased persons excluded. A set of rules should be given governing the important items of sanitary conduct in the water, *e. g.*, the importance of showering before and after bathing, the importance of taking sitz showers with soap, of abstaining

from expectorating in the water, the importance of emptying the bladder before entering the water, etc. Patrons and students should be compelled either to bath nude, or to use clothing the cleanliness of which has been approved by the director."

Housing in Six Cities.

The field secretary of the National Housing Association, Mr. John Ihlder, reviews in the *National Municipal Review* for October the reports on housing conditions in six American cities, each of which, he says, may be regarded as typifying the cities of its section. These are: Cambridge, Mass., Philadelphia, Richmond, Va., Los Angeles, Cal., Grand Rapids, Mich., and Cleveland, O. One of the reports sets out with the definition that "a housing problem may be said to exist wherever persons dwell under conditions dangerous to health, safety, and morality." While the reports reveal chiefly bad housing conditions, progress is also recorded, representing in these particular instances the beginning of the housing movement. The revelations made are designed to awaken an uninformed community to a realization of the facts. The publication of the Grand Rapids report was followed by an agitation for municipal regulation which resulted in the appointment of a housing council. Eventually there was drafted and adopted a housing code which the writer declares is at present the best in the country. An illustrated pamphlet by Miss Mildred Chadsey, chief of the Cleveland Bureau of Sanitation, on the housing conditions of the workingmen in that city, also comes in for commendation by the reviewer, who concludes: "It

would pay other cities to measure themselves by Cleveland and learn whether they can equal its best and whether they do not exceed its worst."

Pure Milk Gains.

Pure Milk is making gains all over the country. *Public Health Reports* for May 15, 1914, contains a tabulation of bacterial standards in about 150 cities of the United States, having an aggregate population of about 21,000,000. Only a few years ago cities having bacterial standards were few and far between. The Housewives' league of Providence, R. I. (*The Survey*, Apr. 4, 1914), after a fifteen months' campaign which is said to have disclosed much dirty milk and some graft, and after being defeated in the city council, secured state legislation which transferred the control of the milk supply from a political milk inspector to the superintendent of health. St. Louis, Mo., through its municipal assembly, has adopted a new milk ordinance (*The Survey*, May 16, 1914) which places the granting and revocation of milk permits in the board of health and, besides other sanitary requirements, provides that after one year from date all milk sold in St. Louis must either be from cows (dairies?) which have been inspected and approved by the Board of Health or else must be pasteurized by the "holding method."—The supreme court of Illinois (*Koy v. Chicago*, Feb. 1914) has upheld a provision of a Chicago ordinance which requires milk to be pasteurized and lays down conditions of pasteurization.

M. N. Baker, in *National Municipal Review*, October.

PERSONAL NOTES.

The following persons were elected to membership in the American Public Health Association, during October.

OCTOBER 8.

George O. Adams, Lawrence, Mass.
Albert W. Buck, North Adams, Mass.
R. W. E. Cole, M. D., Arlington, Mass.

Wallace Payton Crigler, Ocala, Fla.
Haven Emerson, M. D., New York City.
William Haine, Hartford, Conn.
Ethel Lyon Heard, M. D., Galveston, Texas.
Stephen Russell Mallory Kennedy, Pensacola, Fla.
Friend Lee Mickel, Hartford, Conn.

Stanley H. Osborn, M. D., Cambridge, Mass.
 Philip S. Platt, New York City.
 Carl Frost Raver, M. D., Grand Forks, N. D.
 Godfrey Leonard Alvin Ruehle, Geneva, N. Y.
 R. H. Simmons, M. D., Shamokin, Pa.
 George D. Troutman, M. D., Tucson, Ariz.
 George B. Zimmele, Brookline, Mass.

OCTOBER 20.

George Ethan Adams, Milwaukee, Wis.
 Lawrence Vreeland Burton, Urbana, Ill.
 Mrs. Robert Goodhue Clarkson, New York City.
 Henry Burdett Cleveland, Albany, N. Y.
 Georgia Elizabeth Fleming, Urbana, Ill.
 James W. Glover, Ann Arbor, Mich.
 Stephen John Hauser, Cincinnati, Ohio.
 William Duke Hayes, Jacksonville, Fla.
 Grahame E. Henson, Jacksonville, Fla.
 William Leland Holt, M. D., Jacksonville, Fla.
 Charles Alpha Howland, Albany, N. Y.
 Clarence Guy Lane, Woburn, Mass.
 James F. McKinstry, Jr., M. D., Gainesville, Fla.
 John MacDiarmid, M. D., DeLand, Fla.
 Oliver Joseph Miller, Sanford, Fla.
 Frank C. Perry, M. D., Jacksonville, Fla.
 Charles Herbert Purdy, Jacksonville, Fla.
 James Knox Simpson, Jacksonville, Fla.
 Joel Andres Sperry, 2nd, Urbana, Ill.
 Robert Victor Story, Middletown, Conn.
 Edward Stuart, West Pownal, Maine.
 Edward L. Wagner, New York City

OCTOBER 24.

Clarence Mulford Baker, Albany, N. Y.
 Walter Jay Carpenter, M. D., Katanah, N. Y.
 Edward Clark, M. D., Buffalo, N. Y.
 Grover S. Cox, M. D., Tabor, N. C.
 Clarence Christian Craft, Florence, S. C.
 Guy C. Emerson, Boston, Mass.
 Wm. Turner Fowles, Glenside, Pa.

Maurice Eby Heck, St. Augustine, Fla.
 Leroy Watkins Hubbard, Mt. Vernon, N. Y.
 Frank G. Jones, Indianapolis, Ind.
 Charles A. LaMont, Canton, Ohio.
 Calvin Gates Page, M. D., Boston, Mass.
 Francis LeJau Parker, Ph. D., M. D., Charleston, S. C.
 Alexander Potter, New York City.
 Harry O. Sappington, M. D., Galveston, Texas.
 Herbert Hector Utley, Smithfield, N. C.
 E. Van Hood, M. D., Ocala, Fla.
 Philip Van Ingen, M. D., New York City.
 Willie Joseph Vinson, M. D., Tarpon Springs, Fla.
 John Morris Weiss, New York City.
 Wesson & Booker, Inc., Columbia, S. C.

OCTOBER 31.

Joseph M. Ayres, Bennington, Vt.
 Alfred William Balch, Boston, Mass.
 Richard Olding Beard, M. D., Minneapolis, Minn.
 Charles White Berry, M. D., Brooklyn, N. Y.
 William Merriam Cobleigh, New York, Mont.
 Willard Joseph Denno, M. D., New York City.
 James Hugh Finch, M. D., Champaign, Ill.
 Frederick H. Gebhardt, M. D., Rutland, Vt.
 D. Greenberg, New York City.
 Murray Philip Horowitz, New York City.
 James M. Jackson, Miami, Fla.
 Henry Abner Ladd, M. D., Burlington, Vt.
 Robert D. Luster, M. D., Granite City, Ill.
 Jeanette Marks, South Hadley, Mass.
 E. A. Moree, New York City.
 Carl Shepard Oakman, M. D., Detroit, Mich.
 John Albert Robison, M. D., Chicago, Ill.
 Henry C. Sherman, New York City.
 Henry Crain Tinkham, M. D., Burlington, Vt.
 Wm. Alexander Womer, New Castle, Pa.

INDUSTRIAL HYGIENE AND SANITATION.

Regulations for the Prevention of Accidents in Foundries of Great Britain.

The regulations given below were compiled and recommended by the Home Office of Great Britain as a result of the conferences recently held at Manchester (England), between the Factory Department, represented by the superintending inspectors of each division, the inspector for dangerous trades and other inspectors, and representatives of associations of foundry employers and operatives.

"Where iron plates are used in moulding shops, either as gangways or under furnace spouts, they should be kept dry.

"Where molten metal has to be carried by hand between rows of boxes, a clear passage way, not less than 18 inches in width, should be maintained.

"Where molten metal has to be carried across an open space, a clear passage way, dry and covered where practicable, should be provided between the cupola and the place where the casting takes place; provided that it should not be deemed to be practicable to erect a covered way, if to do so would interfere with operations necessarily carried on in intervening space.

"No person under 16 years of age should carry molten metal.

"All chains used for lifting or moving any material should have been tested and should be periodically examined. They should be effectually softened by annealing or firing when necessary, and half-inch or smaller chains in general use should be re-annealed or fired once at least within every six months.

"Chains to which new links or rings have been added should not be used until they have been re-tested.

"A register should be kept on the premises, containing the distinctive mark or number of each chain, the date of the test, the test load, the safe working load, and the dates of annealing.

"First aid dressings for wounds or burns should be provided and kept at the factory.

"Adequate protection for the feet should be provided and maintained in proper order

and repair, for the use of all persons employed in any part of a foundry where molten metal is caught, carried or poured. It should consist either of closely fitting boots constructed without lace holes or other openings in which molten metal can lodge, or of spats, flaps, or other appliances fitting closely above the ankles and covering all such openings in the boot, shoe, or clog worn by the worker.

"Every person employed in any part of a foundry where molten metal is caught, carried, or poured, should, while at work, constantly wear the protection for the feet specified above."

Bulletin of the American Museum of Safety,
July-August.

Sanitary Survey of Indiana Industries Em- ploying Women Labor.

A survey made during March and April, 1914, of the sanitary working conditions of women of Indiana, by Dr. M. J. White of the United States Public Health Service, is reported in Supplement No. 17 to the Public Health Reports. It included 96 industries located in 13 different cities of Indiana. Such industries as mills, factories, department stores, and laundries were inspected with the idea in mind of making recommendations regarding improvements in ventilating, lighting, dust and fumes disposal, fire-escape facilities, water supply, and home hygiene. Physical examination of employees was found difficult owing to lack of facilities at the places of employment. However, from what little physical examination was made, it was found that none of the workers appeared to be in a particularly poor condition. Absolute evidence of industrial disease was not found among any of the industries. The only probable disposition to mechanic's palsy was noted among the girls working at glove turning.

In regard to ventilation, Dr. White emphasized the fact that a suitable system should be used so that plenty of fresh air could be supplied without draft. The air source should be carefully chosen and the inlets carefully placed so as to avoid stirring up

dust. The necessity of proper lighting is also touched upon. Direct sunlight is injurious to the eyes, as are unshaded electric lamps such as are used on sewing machines.

Where dust and fumes were found it was recommended that proper fans and hoods be used so as to remove these nuisances at the source rather than allowing them to circulate through the air of the room. More efficient means of escape from fire is also emphasized. It is recommended that fire drills and inside fire-alarm systems be installed, and that there be wider aisles between machines wherever possible and more than one exit from the same room.

It was noted, especially among the novices, that there was a tendency to overfatigue, and the recommendation was that convenient places of rest be installed to be used by the women whenever not directly engaged in active duties. It was found that the present laws regarding safeguards on machines were adequate. Three important recommendations are in regard to the adoption of individual drinking cups, individual towels, and liquid soap in place of bar soap. Water supplies both from private and public sources were found generally to be good.

Signs and Slogans.

"Signs and Slogans" is the title of *Accident Prevention Bulletin No. 19*, prepared by the Independence Inspection Bureau of Chicago and Philadelphia.

The first half of the *Bulletin* takes up accident prevention in: Offices, Storerooms, Machine Shops, Carpenter Shops, Foundries, Power Houses, Quarries and Yards. Each receives a short discussion, and special methods to be employed are suggested.

The latter part of the *Bulletin* is devoted to the proper methods to be used in painting and placing signs. Twenty such signs are reproduced in color and the Bureau says in conclusion that it is urged that each company get together standard types of signs for its use, with standard sizes and standard wordings for different locations.

Sanitary Standard for Bakeries.

The National Association of Master Bakers has adopted the following rules:

(1) Building well lighted in every part with natural light, and thoroughly ventilated; air supply kept free from contamination by surface dust.

(2) Floors, walls and ceilings of impervious materials with smooth surfaces and kept clean. Rooms kept free from vermin, and screened against flies.

(3) Plumbing, drainage, etc., ample to remove waste and prevent dampness, and kept in good order. Sanitary toilets, shut off entirely from bakeshop and storage room.

(4) A plentiful supply of pure water. Convenient and adequate washstands and supplies.

(5) Garbage, refuse, etc., stored in tightly covered cans and disposed of quickly.

(6) Machinery, tools and other equipment so made, installed and used as to facilitate cleanliness and safety.

(7) Stables to be disinfected and so located as to prevent odors from them reaching the bakery.

(8) Methods of distribution such as to protect bakery products from contamination between the oven and the home.

(9) A health certificate, showing freedom of all employees from skin diseases, tuberculosis, venereal and other contagious diseases. Spitting and the use of tobacco in the bakery prohibited.

(10) Employees of bakeries to be properly clothed in clean, sanitary garments.

Sidewalk Hazards.

"One hundred and thirty-seven *immediate* deaths due to falls on sidewalks in New York City in 1912 and 1913 are recorded in the Coroner's office. There is no record of subsequent deaths, permanent and minor disabilities resulting from the same causes, but their number must be enormous. The elimination of the causes of these accidents is demanded in the interests of public safety," says the September *Bulletin of the American Museum of Safety*.

"Even a casual inspection of our sidewalks shows astonishingly hazardous conditions. Slippery surfaces such as coal-hole covers, sidewalk or vault lights, curb edgings and vent grades are hazards that are most common and productive of serious accidents.

One casualty insurance company received reports of nine different accidents in one day on one coal-hole cover. The glass surfaces of vault lights and the usual iron borders around them if not protected are always dangerous, but under certain weather conditions are a positive menace to the safety of pedestrians."

"All the conditions mentioned here are unquestionably dangerous. Steps should be taken at once to reduce and, if possible, to eliminate such conditions. While it is easy to point out such hazards, it is extremely difficult to get the proper repairs made. There seems to be no definite jurisdiction in such matters. Policemen are supposed to report slippery coal-hole covers and similar dangerous places. They do report them, but what becomes of the reports? Casualty insurance inspectors call the attention of their clients to dangerous places. Sometimes their advice is taken, but in the majority of cases the property owner is apathetic. Architects and builders could prevent many hazards by proper attention to such details. To insure their consideration *definite* rulings and ordinances should be made covering the requisite protective construction of sidewalks, and jurisdiction in such matters should be clearly defined."

Resuscitation from Mine Gases.

The Committee on Resuscitation from Mine Gases has made an excellent report which appears in *Technical Paper 77 of the Bureau of Mines*, Department of Interior. The Committee appointed in 1912 at the request of Joseph A. Holmes, Director of the Bureau, made an exhaustive study of methods of inducing artificial respiration to those overcome by gases or electric shock. The Bureau makes the following recommendations in administering first aid to those overcome:

"In case of gassing, remove victim at once from gaseous atmosphere. Carry him quickly to fresh air and immediately give manual artificial respiration. Do not stop to loosen clothing. Every moment of delay is dangerous."

The recommendations of the committee are summarized as follows:

"In all cases of suspended or inadequate respiration, as in very slow breathing, the method of artificial respiration which can be most quickly applied should be used at once. In most cases, where good air is present, manual methods of artificial respiration are most immediately useful. Of those the modified prone pressure method already described is best. If there is on the victim a local wound that the prone pressure method may seriously increase, the Silvester method, in which other parts of the body are moved, may be substituted.

In cases of CO poisoning, oxygen should be given instead of air. If the victim is breathing at approximately the normal rate, oxygen may be given very simply by fastening to the face of the victim a mask supplied with straps to hold it in place, fitted with an outlet valve opening to the air, and also fitted with a tube having an inlet valve and connected with a breathing bag. Such masks are on the market. The breathing bag is kept provided with oxygen from a cylinder. If the victim is breathing slowly or irregularly or has ceased breathing, he should be given the oxygen, in the absence of other means, by a manual method of artificial respiration, preferably the prone pressure method.

"In case of electric shock, break electric current instantly. Free the patient from the current with a single quick motion, using any dry nonconductor, such as clothing, rope, or board, to move patient or wire. Beware of using any metal or moist material. Meantime have every effort made to shut off current.

"Attend instantly to the victim's breathing. If the victim is not breathing, he should be given manual artificial respiration at once.

"If the patient is breathing slowly and regularly, do not give artificial respiration but let nature restore breathing unaided.

"In gas cases, give oxygen. If the patient has been gassed, give him pure oxygen, with manual artificial respiration.

"The oxygen may be given through a breathing bag from a cylinder having a reducing valve, with connecting tubes and face mask, and with an inspiratory and an expiratory valve, of which the latter communicates directly with the atmosphere.

"No mechanical artificial resuscitating device should be used unless one operated by hand that has no suction effect on the lungs.

"Use the Schaefer or prone pressure method of artificial respiration. Begin at once. A moment's delay is serious. Proceed as directed in Miners' Circulars 5 and 8 of the Bureau of Mines and on pages 15 to 17 of this paper.

"Continue the artificial respiration. If necessary, continue two hours or longer without interruption until natural breathing is restored. If natural breathing stops after being restored use artificial respiration again.

"Do not give the patient any liquid by mouth until he is fully conscious.

"Give him fresh air, but keep his body warm.

"Send for the nearest doctor as soon as accident is discovered."

The recommendations concerning mechanical apparatus designed to restore natural respiration are:

"Of mechanical devices for artificial respiration, the committee has examined the pulmotor and the Dr. Brat apparatus and disapproves of them, because repeated suction of air from the lungs is not physiological, and if continued is likely to result in injury to the lungs and inadequate inflation; and disapproves of the pulmotor also because the automatic mechanism is so readily disturbed as to be a frail dependence at critical moments.

The committee recommends the apparatus devised by Dr. Meltzer because of its certain action, its freedom from sucking in expiration, and its lightness, cheapness, and simplicity. And the committee suggests that in cases of suspended or insufficient breathing the modified prone pressure method be supplemented as soon as possible by the use of this apparatus."

Medical Examination of Employees.

There has recently been published, by the Advisory Council of the National Association for the Study and Prevention of Tuberculosis a symposium, the topics of which are: The Campaign in Chicago for Medical Examinations of Employees, an efficient system of medical examination of Employees, The Relation of Medical Examination of Employees to the Hygiene of the Working-place and the efficiency of the Working Force, Medical Examination of Employees as a Part of Industrial Insurance.

The symposium concludes with a discussion of the different papers presented and the president of the association says in his concluding remarks, that the problems of each peculiar trade should be worked out separately. This requires careful observation, study and examination, but it is only by some relationship between the medical examiner, the employer and the working man that we can get a solution of the question.

Workmen's Lunch Room.

The Commonwealth Steel Company of Granite City, Ill., wishing to establish pleasant coöperation between the Company and its men, has converted its old Pattern Shop into a Lunch Room at a cost of \$12,000. The Company feels that there is a Safety First and efficiency value in good and wholesome food being furnished to workmen.

The Company has prepared a short illustrated paper in regard to their Plant Lunch Room, which contains valuable data regarding costs of foods, methods of operation and maintenance.

Standards of Safety.

The Standardization Committee of the National Council for Industrial Safety has submitted for discussion and consideration, at its annual meeting, Tentative Standards for Safety.

The paper prepared by the Committee considers sixty different sources of danger and gives valuable suggestions to eliminate these dangers.

Some of the more important subjects considered are: General Rules, Boiler Plants, Cranes, Emery Wheels, Engines, Explosives, Stairs and Wood-working Machinery.

The Committee has attempted to study and bring into concrete form procedures which will be practicable to apply.

Industrial Sanitation.

The May and June issues of the *Bulletins of the Milwaukee Health Department* contain the rules which the General Manager of the Erie Railroad Lake Line has issued.

Some of the more important of these are: "The health of the ship's company is fully as important as the safety of the ship and her cargo and the supervision of the water supply will be the care of the master exclusively and cannot be delegated by him to anyone. Isolated sources of supply and methods of distribution have been or will be provided, and under no circumstances will the tanks be filled from or through any other. The sea-cock will be kept locked and the key in the possession of the master. When water is to be taken the master will give, or send, the key to the engineer on duty, who will personally see that the sea-connection is thoroughly boiled out, by means of the steam connection provided for the purpose, for at least five (5) minutes before opening sea-cock. The engineer will also personally close and lock the sea-cock and return the key to master.

"Water tanks are to be thoroughly cleaned and scrubbed out with a strong caustic solution at least once in each month and the solution drained and flushed away through the distribution service. Except in case of fire, buckets or other vessels are not to be dipped into tanks, and every effort is to be made to keep them free from contamination.

"In taking water, masters will exercise due caution with regard to ships ahead and haul courses if necessary to clear their wake.

"Drinking cups or vessels used in common should be thoroughly boiled at frequent intervals or discarded, and the use of water buckets as containers for drinking water should be discouraged as far as possible. When used in fire holds they should be boiled out frequently with the steam hose.

"Natural ice is not to be taken aboard under any circumstances unless artificial is unobtainable and then only when its source is clearly known and satisfactory, and in quantity only sufficient for immediate needs. Ice boxes should be thoroughly scrubbed out after any such supply. No ice at all is preferable to a supply of doubtful quality.

"As corporations and individual employers generally appreciate the need of maintaining sanitary conditions, factory and other sanitary inspectors will become less necessary."

Disease is costly and employers are beginning to appreciate the fact. It is not entirely a question of sentiment. It is equally a question of business.

Accident Prevention Record of the New York Central and Hudson River Railroad.

Since February 1, 1911, not a passenger has been killed on the New York Central and Hudson River Railroad in a train accident. In this period 1,266,654 passenger trains and 819,513 freight trains were operated, day and night, and in all kinds of weather.

In computing passenger train business, it is customary to indicate the number of passengers carried one mile. For instance, a passenger carried fifty miles would be equivalent to fifty passengers carried one mile. There were therefore, 5,286,931,140 passengers carried one mile during this time, or fifty-two times the population of the United States.

Bulletin of American Museum of Safety, September, 1914.

AMERICAN JOURNAL OF PUBLIC HEALTH

THE MODERN ASPECT OF THE TUBERCULOSIS PROBLEM IN RURAL COMMUNITIES AND THE DUTY OF THE HEALTH OFFICERS.

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On the 16th of September, upon the invitation of the Commissioner of Health, I delivered an address at Saratoga Springs before the 700 sanitary officers of the State of New York, assembled there for their annual conference. What I have seen, read, and learned from conversations with health officers in rural communities in Canada, Mexico, and Cuba has convinced me that the conditions in the three latter countries, while not exactly the same, still do not differ very materially from those in the United States. It would seem, therefore, that perhaps the publication of the address in the AMERICAN JOURNAL OF PUBLIC HEALTH, a magazine read widely not only in the United States, but also in Canada, Mexico, and Cuba, and particularly by the health officers, might be helpful to the latter in their work of dealing with the tuberculosis problem in smaller communities. I have added some important items which, for want of time, I could not discuss at the time the address was delivered but which I have reason to believe will enhance whatever value this communication may possess.

When I was first asked to speak on the subject of the tuberculosis problem in rural communities, I could not for the moment think that there should be any great difference between the tuberculosis problem in the city or in the town or village. But after some reflection I could well see that there is indeed quite a difference in the method by which tuberculosis must be attacked in the community which on the one hand has not the administrative machinery of a large city, and where on the other, because of the

close personal relations, friendly and neighborly in many instances, the health officer seemingly has not always a free hand to say and do what he thinks is best for the interest of the community at large.

Take, for example, the spitting nuisance. Many a worthy inhabitant of a small village or town, should he be forbidden to expectorate freely where he pleases, when in winter he and his neighbors congregate around the warm stove in the grocery store or post-office and solve the problems of the universe, would consider an anti-spitting regulation an infringement on his inalienable rights as a free citizen. The same would probably hold good if when sitting in summer in front of his own home he should dispose his accumulated pulmonary, bronchial, or salivary secretions or the juices of his chewing tobacco on the sidewalk.

In countries like Cuba and Mexico, on the Plaza, the place where the masses congregate, the spitting nuisance will be equally difficult to combat and it will require a great deal of tact on the part of the health officers of those Spanish-American communities to enforce anti-spitting regulations. It is difficult for those citizens to see how they may not only injure themselves and their families, but the entire community by uncleanly and unsanitary habits.

When, as it happens not infrequently, the careless spitter is upheld by some worthy but retrogressive member of our profession, be it because of political or family antagonism to the present incumbent of the health office, then there surely will be discord and continued spitting. Of course, there are exceptions, but I know that situations such as I have just described do occur and they make the carrying out of sanitary regulations exceedingly difficult in rural communities.

Should there be any community progressive enough to have made tuberculosis a reportable disease, I can readily see that there might occasionally arise unpleasant feeling when the health officer insisted upon reporting such cases. The fear that after being reported a stigma will be fastened upon an individual or family is often an inducement to hide the disease. We all know the danger of the tuberculous individual to a community, small or large, when he behaves as if he were not tuberculous. Even if he should be careful at home because of the advice of a conscientious family physician, he will often be careless when away from home, disseminating his seven billion bacilli per day by the deposit of his sputum where it will have a chance to dry and pulverize and be inhaled as bacilliferous dust by others. He may also propagate his disease through droplet infection. It is very strange how this latter source of infection is sometimes overlooked by otherwise well-trained physicians. The expression "dry cough" is even used by some medical men, yet we all know that small particles of saliva are expelled during the cough, even if the individual does not expectorate.

Whenever the establishment of a provincial or local hospital for the care of tuberculous patients is contemplated, I know from experience what a prejudice the people have against the erection of such an institution in the vicinity of any community, and there is also a prejudice on the part of many tuberculous individuals against entering such an institution. We may put it this way: The most difficult phase of the tuberculosis problem in rural communities is phthisiophobia—the exaggerated fear of the presence of a tuberculous individual. On this fear is based the disinclination of prospective patients to have their chests examined during the onset of early symptoms, such as cough, loss of weight, rise of temperature, hoarseness, sanguineous expectoration, etc. They and their relatives fear being stigmatized in the event tuberculosis is diagnosed and reported. In brief, phthisiophobia is responsible for the disinclination to obey anti-spitting laws, the disinclination of the community at large to have tuberculosis hospitals or sanatoria in the neighborhood, and last but not least, the disinclination of individuals to enter these institutions for treatment and cure.

To some of the younger and less experienced physicians among my readers it might sound strange when I say that the majority of tuberculous individuals think themselves perfectly harmless and are afraid to enter tuberculosis institutions for fear of becoming infected there; and this fear is not infrequently shared by other members of the family. We all know that the successful treatment in the home of the patient, while feasible in some instances, is impossible in many. Yet, upon the early discovery and the prompt treatment of the tuberculous invalid at the right time and in the right place depends in no small degree the solution of the tuberculosis problem.

What can the health officer of a rural community do in the face of the tremendous difficulties which confront him in his honest and sincere effort to be helpful in the combat of tuberculosis? Let me answer this question by picturing my ideal of what such an officer should be.

First of all, the ideal health officer of a rural community must be an ideal man; he must be beloved for his personality, for his tact in dealing with patients, with his fellow physicians, and the other authorities in the community. He must be a thoroughly trained sanitarian. While it would be desirable for him to have a degree of Doctor of Public Health besides the degree of Doctor of Medicine, this to my mind is not absolutely essential; but he must be a thoroughly trained medical man to whom his fellow practitioners can look up and whom they can call on for counsel.

In one of the issues (No. 36, Vol. 29)* of the *Public Health Reports*, published by the United States Public Health Service, in an article entitled "The Making of Health Officers," my good friend, Assistant Surgeon-

* "The Possibility of State Departments of Health Improving the Efficiency of Local Health Officers by Means of Correspondence Courses."

General John W. Trask, in deploring the fact that "there are exceedingly few men with requisite training from among whom the thousands of local health officers can be appointed," recommends a correspondence course in health administration and allied subjects for improving the efficiency of these officers. I most highly approve of this suggestion but would urge that facilities for clinical instruction should be provided in addition, for the ideal health officer should not only be versed in sanitary science in general and be familiar with all the means of preventing endemic and epidemic diseases, but he should also be an expert diagnostician of communicable and contagious diseases, which knowledge cannot be acquired by correspondence.

Besides being all this, he need have not necessarily the gift of oratory, but he should be able to give good practical talks to physicians and to laymen on medical topics, sanitation, and the prevention of diseases. Last but not least, and I may say this with all due respect for the authorities, the health officer of any county must and should be paid a salary high enough to make him independent of practice so as to enable him to devote all his time to his official duties. The position should be for life, as long as he is able to do his duty. It should never depend upon political preferment.

If the community is too small to maintain a well-paid health officer, let us follow the suggestion of Mr. Geo. J. Nelbach, of the Tuberculosis Committee of the New York State Charities Aid Association, and unite a number of the smaller communities under the administration of one health officer, who because of being well paid can be held responsible for the sanitary conditions of the various communities comprising his sanitary district or unit.

And, now, what are the particular duties of this officer concerning the tuberculosis problem? After having united with his fellow practitioners of the community to form an anti-tuberculosis league, after they have pledged themselves to aid him in a conscientious war not against the tuberculous but against tuberculosis, he should give regular popular talks to the town or village folks on the prevention of this disease, of course always under the auspices of the local physicians. The conscientious health officer should prepare himself carefully for such tuberculosis conferences, for it is not so very easy to talk the language of science in the language of the people. Nothing is more difficult than to avoid scientific terms when accustomed to them, and at the same time nothing is more detrimental to the good effect of a popular medical talk than the use of big words and phrases familiar to the medical ear but sounding like Greek, Latin, or Hebrew to the lay mind.

Let the lecturer begin by defining tuberculosis, not as a dangerous contagious disease, but merely as a communicable one, which only becomes

dangerous through ignorance and carelessness. I ascribe the wonderful success of the anti-tuberculosis work in New York City, inaugurated by the distinguished Commissioner of Health of the State of New York and my distinguished teacher, Hermann M. Biggs, to the fact that from the very onset of his propaganda he classified tuberculosis with the communicable and not with the contagious diseases. One must first overcome the fear of the disease in order to combat it successfully. It is a good thing to tell a lay audience that probably every one of them, or at least nine tenths of them, have or have had tuberculosis at one time or another in their lives, and that we are not at all certain that a slight attack of tuberculosis does not confer upon us a certain immunity to future attacks. The lecturer must explain, furthermore, that when we are in good health, thanks to the bactericidal quality of the Schneiderian membrane of our nose, the upward waving cilia in the upper respiratory tract, the phagocytic power of the antibodies in our blood, and the bacteria-killing power of the gastric secretions, we have natural factors of defense against tuberculosis. Otherwise, probably every one of us would be ill with the disease. Then let him emphasize in as strong language as it can possibly be put the fact that the honest conscientious consumptive, who takes care to avoid infecting others by his sputum or saliva, is not a danger to his fellowmen and is as safe to associate with as anybody else.

To explain to a lay audience the difference between a contagious and a communicable disease take smallpox as an example. It should be made clear to the hearers that no matter how clean and conscientious a smallpox patient may be, they should not go near him nor touch him unless they have been vaccinated and re-vaccinated and that they should stay away from the smallpox hospital in general. On the other hand, the audience should be told that they may safely touch and shake hands with the conscientious consumptive and even kiss him on the forehead, if they must kiss, and nothing will happen to them. They can also be assured that the well-equipped and well-conducted tuberculosis hospital or sanatorium is the safest place not to catch consumption in.

In popular tuberculosis talks one should never fail to lay emphasis on the value of early diagnosis and impress upon his hearers the fact that an annual or semi-annual examination of their chests by their family physician is one of the safest and, from every point of view, most profitable investments for retaining or gaining health they could possibly make. Since the health officer counsels these people to be examined by their own physicians they will see the altruism in his giving this valuable advice.

In reference to the tuberculosis institution, hospital, or sanatorium, we can also conscientiously say that because of the careful training of the patients and the splendid hygiene in vogue in such institutions no physician, no nurse, no visitor, or healthy inmate ever contracted tuberculosis

there. This also should be told to those who object on sentimental or sanitary grounds to the establishment of tuberculosis institutions in their neighborhood. The mortality from tuberculosis among the inhabitants of villages surrounding sanatoria invariably decreases with the establishment of such institutions. By existing statistics, which are available to all, it can be proven to those who object on account of depreciation of property values, that real estate has improved in the vicinity of institutions for the tuberculous and we will very quickly win over to our side the real estate owner and the real estate dealer.

In talks to the townspeople and farmers, and particularly to the women, the value of fresh air should be taught. They have so much in the country and they make so little use of it; they should be told that the fear of night air is a nightmare, for night air is just as good as day air. In Mexico and Cuba the fear of the night air, particularly at the time of the full moon, amounts in many instances to an almost unconquerable superstition. Here again much patience, education of old and young, and tactful persistent agitation on the part of the health officers will be necessary to overcome the pernicious habit of sleeping with tightly closed windows and doors which is so prevalent in tropical countries. Of course, we all know that this fear of night air in these countries originated in the fear of contracting yellow or malarial fever during the night, and prior to the immortal discoveries of Reed and Lavanan and the works of Gorgas, even physicians looked upon the night air in tropical countries as a propagator of these diseases.

Children and adults should be taught the art of deep breathing; adult audiences should be told all about the necessity for proper food and regular habits and also the danger of intemperance, since alcohol is a strong predisposing factor to tuberculosis.

The habit of cigarette smoking among the adults, male and female, and, alas! also among children, will be even harder to overcome in countries like Mexico and Cuba than in the United States and Canada. Yet that excessive cigarette smoking, particularly because the smoke is inhaled deeply into the lungs, is one of the predisposing factors to diseases of the respiratory tract, particularly of the larynx and the lungs, needs no further argument to be proved. Excessive cigarette smoking lessens the vitality of the individual and makes him more susceptible to the invasion of the germs of tuberculosis, pneumonia, grippe, etc.

In Mexican and Cuban communities the health officer will, I believe, have to have qualifications more than the ordinary mortal possesses in order to be successful in an anti-cigarette crusade among the adults, but he may be able to do a great deal for the children. If he and the teachers will unite to show the impressionable children that cigarette smoking is detrimental to their physical and mental development and that it will

render them susceptible to an early nervous and mental breakdown, they will listen and obey, and thus a vast amount of good can be accomplished and cigarette smoking among children perhaps become unpopular. But let me say in passing that nothing impresses a child so much, teaches him something so thoroughly as example, and unless the health officer and the teacher cease smoking cigarettes themselves, their anti-cigarette talks to children will make very little impression.

The health officer should insist upon the enforcement of anti-spitting laws, should have the people do away with the roller towel at home, in hotels, and in other public or private washrooms. In the United States, Canada, Cuba, and Mexico there are any number of hotels in which the roller towel and the common drinking cup seem to be still permanent fixtures and badly kept spittoons the usual ornament of the lobbies and public assembly rooms.

Outdoor sleeping, which can be carried out so much more easily in smaller communities than in larger ones, should be encouraged. The chiming of bells and the striking of the town clock between the hours of 9 p. m. and 7 a. m. should be stopped as well as other unnecessary and distressing street noises; they are as bad for the nerves of the indoor as the outdoor sleeper and it is as bad for the non-tuberculous as for the tuberculous to be kept awake at night. Except in small villages, I don't see any earthly reason why the rooster nuisance could not also be done away with as has been done in New York City where we recently passed a regulation which will go into effect on November first. This regulation will not permit residents of the City of Greater New York to keep roosters; it will also prohibit persons from raising chickens in their back yards where there is another residence or public institution within seventy-five feet of the poultry enclosure.

The hygiene of rural schools must be improved. In the larger cities we erect the most beautiful buildings for our school children; in some villages and small towns anything from an old barn to the old-fashioned red brick building with low ceiling, with little or no ventilation, and bad lighting, has to do. These schools should be remodeled into open air schools or new ones built in which there should be plenty of open air classrooms. I have said before and I am willing to say it again that in my humble opinion open air schools, at least for primary grades, must become the rule and indoor classes the exception if we wish to prevent and combat tuberculosis in childhood.

In warm countries, particularly in the villages, open air schools should predominate and a good part of the time the smaller children could be taught entirely in the open air.

Health officers should even concern themselves with the hygiene of the churches. Places of worship should be properly ventilated and frequently

cleaned. In Protestant churches the use of individual communion cups should be advocated and in Catholic churches careful attention should be paid to the frequent disinfection of crosses and other articles of adoration, often kissed by the devout.

Anti-tuberculosis talks should be given to priests, ministers and teachers or directly to the children; and popular medical literature distributed in schools for the children to take home, will make fresh air apostles of these little ones and reach the old folks at home, thus combating the tendency to tuberculosis in the adults and in the young.

The laws against bovine tuberculosis should be enforced, for we must bear in mind that ten per cent. of the tuberculosis in childhood is due to the bovine type of the disease. All milk except such as comes from cows periodically tested with tuberculin should be sterilized. No individual with an open pulmonary tuberculosis (when the disease is active and bacilli are found in the sputum) should be employed in a dairy or in the handling of milk in stores.

All suspected sputum sent to the health officer must be carefully examined, but the physicians sending these specimens should be told that often several specimens are necessary in order to find the tuberculosis germ; and it cannot be repeated too often that, while the presence of tubercle bacilli in the pulmonary secretion of the individual is absolute proof of the existence of the disease, the absence of the germ does by no means prove that there is no tuberculosis. In the earlier stages of the pulmonary type of tuberculosis, because of little disintegration of pulmonary tissue, the germs of the disease are found but rarely, and yet it is in this early stage that we can most hope for complete recovery. It is therefore of vast importance that every community should have physicians who are experts in the physical diagnosis of the disease in its earliest stages, and the health officer of a community should be particularly qualified to aid his fellow physicians in the early discovery of tuberculosis.

Health officers should see to it that every patient with open tuberculosis receives hospital and sanatorium care, or at least gets his sanatorium treatment under intelligent guidance at home. There should be no uncared for tuberculous individual in any community which has an efficient health officer and an intelligent municipal or county government. The sanatorium should be made a center of education for physicians and laymen, and hospitals for advanced cases should be made attractive, so that those who ought to enter will enter willingly and gladly because they will receive better treatment there than they could at home. If the institution has cheerful and attractive features they will miss the home less.

The consumptive is the ideal victim of the quack, charlatan, and vendor of patent medicines, and this is particularly true of the consumptives who live in rural communities where often the local papers derive their greatest

income from advertising nostrums and sure cures for consumption and other diseases. There should be a health publicity column in the local paper to enlighten the public. If necessary, the provincial or local department of health should pay for this to compensate the poor editor for his loss of quack advertisements. The laity should be told that there is no sure cure for consumption; that good air, rest, and good food under careful medical supervision, and the scientific administration of medicine to relieve distressing symptoms are, up to this date, our only means of curing tuberculosis, and that every advertisement of a sure consumption cure cloaks a swindle.

In all talks to laymen the health officer should try to imbue them with his own enthusiasm and devotion to the tuberculosis cause. He should tell his hearers that tuberculosis is not merely a medical disease but that it has a very large social aspect. Bad housing, overcrowding, dangerous congestion, and even underfeeding exist alas! not only in our large cities, but also in smaller communities. Wealthy and influential citizens should be shown what great good they can accomplish by becoming interested in the amelioration of such conditions as are conducive to the spread of tuberculosis. They will themselves benefit in the end from a clean and healthy community. Personal service to the consumptive poor, and kind, generous, and considerate actions toward those afflicted with tuberculosis, rich and poor alike, will create a better and more helpful feeling throughout the community.

It is essential, in order to prevent and cure the disease, that the laymen and physicians of the community, whether large or small, should forget their little social, political, or religious differences and work hand in hand for the common good.

From what has been said it will be seen what a great task the health officer of a small community has before him if he wishes to combat tuberculosis successfully. It would certainly seem easier in the larger cities, but there is one advantage the health officer of a small community has over his colleague in the city, and that is the knowledge of existing conditions by personal observation. If he will but have it for his maxim to make earnest and conscientious war against tuberculosis but no war against the tuberculous invalid; if he has the greatest consideration for the welfare of the latter and thus for the welfare of the community at large, the health officer is bound to succeed; he will ingratiate himself with his fellow practitioners and the community at large which he serves.

16 West Ninety-fifth Street.

INVESTIGATION OF HOOKWORM INFECTION AT THE PING HSIANG COLLIERY, CENTRAL CHINA.

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Several factors have contributed to the belief that an investigation of hookworm infection and the conditions favorable to it in the Ping Hsiang Colliery would yield results of both economic and scientific importance. Among these factors is the paucity of definite and localized studies of the incidence of this disease in central and southern China, together with the well-established fact that the hookworm does occur in these regions. The numerous mines of South Hunan, Kiangsi and the adjacent territory of Kwangtung seemed to offer abundant foci of infection and a possible explanation for the scattered incidence of the disease in these provinces. If any widespread systematic effort is to be made to eradicate ancylostomum in China, the mines, particularly the deeper ones, must receive first attention, according to the analogy of conditions prevailing in other countries.

It is not the purpose of this report to enter on the economic, social or physical significance of hookworm infection. These factors are reasonably as powerful in China as in other countries where further sanitary progress has been made. The abundant literature also cannot be reviewed at this time, nor the history of the disease and of our knowledge of it. For these features, reference is made particularly to the writings of Loos in Egypt, Ashford and King in Porto Rico, and Stiles and his associates in the United States Public Health Service. Within the last four years the situation has been fully reviewed by the Rockefeller Sanitary Commission for the Eradication of Hookworm. The work of the Rockefeller Commission is monumental and the three annual reports so far presented have shown that the disease can be eradicated, as is being done in the United States. The Commission finds that hookworm infection belts the earth in a zone 66 degrees wide extending from 30 degrees south latitude to 36 degrees north latitude. Not one country in this zone is exempt. To summarize, it was felt that investigation of the prevalence and conditions favoring ancylostomiasis in the deep mines of south-central China would be of value because of the known occurrence of the disease in this section, because of the importance of mines in its propagation and spread, and because future efforts to eradicate so serious a disease must be based on definite knowledge of its incidence and strongholds.

With these considerations in mind and desiring to institute studies well within the affected zone, negotiations were opened in January, 1914, between

the Changsha Yale Hospital, located in the capital of Hunan, and Mr. G. Leinung, chief of the staff of German engineers who operate the Ping Hsiang Colliery. The result was a hearty coöperation of the German staff with the Yale Hospital, and a member of the hospital staff was detailed for this investigation which occupied the three weeks from March 25 to April 16, 1914. Many reasons favored the selection of the Ping Hsiang Colliery for this initial investigation. It is the largest colliery in China. Its underground workings are very extensive. The German staff gave every facility and opportunity for the work.

THE PING HSIANG COLLIERY.

The Ping Hsiang Colliery was started some twenty years ago by Mr. G. Leinung representing the German engineers, and Mr. Chang, representing the Chinese company, on the site of native coal diggings which had existed for an indefinite period before. In two decades the institution has grown to its present size with a daily production of 2,400 tons of bituminous coal. Extensions now being built will raise the output to 3,500 tons within the next six months. Approximately 9,000 persons are on the pay-roll, of whom about 6,900 work underground. The colliery is a branch of the Han Yeh Ping Company, a Chinese organization having its headquarters in Shanghai. This company operates an iron and steel plant at Hanyang across the Han River from Hankow which is supplied with iron from a mining branch at Tai Yeh and with coke from the Ping Hsiang Colliery. The coal above the amount converted into coke is distributed through Hunan and Hupeh.

GEOGRAPHY.

The colliery occupies a charming situation in the valley running east from the large walled city of Ping Hsiang in the western edge of Kiangsi Province. It is located at the village of An Yuen five miles from Ping Hsiang. In spite of the 900 miles distance inland from Shanghai, following the course of navigation on the Yang tza and Siang Rivers, the altitude of An Yuen is surprisingly low. The main adit and main level of the mine is just 500 feet above Shanghai sea-level. The range in which the coal-beds lie varies in height from one to two thousand feet above sea-level. This comparatively low altitude is a factor to be remembered in considering the incidence of *ancylostomum*.

An Yuen lies on the watershed between the Siangtung River running west into the Siang River in Hunan, and the Siu River running east into the Kan which empties into the Poyang Lake in Kiangsi. Southeast of the village is the range of the Lo Siao mountains in which are the coal fields. This valley, like all the multitude of valleys intersecting it, is solidly terraced with paddy fields, and the paddy field offers a peculiar and

difficult problem when it is infected with hookworm. The colliery is in longitude 114 degrees east and latitude 27 degrees and 30 minutes north. It is located in one of the richest mineral districts in China, namely, the section south of the mid-Yang-tze, including Kiangsi, south Hunan, and the adjacent portion of Kwangtung. In this district are almost limitless coal fields which have been scarcely scratched by the centuries of native mining in those situations where the strata pinch out at the surface. In conjunction with the coal are vast iron deposits, and also limestone, antimony in places, manganese and silver. Natural gas and oil have not been found but thus far no deep borings have been made in this section.

At present the only approach commercially to the Ping Hsiang Colliery is by steamer from Hankow to Changsha or Chuchow in Hunan and thence by railroad sixty miles at the shortest to An Yuen. A British concession, however, has just been granted for a railroad from Ningpo to Changsha by way of Ping Hsiang with a branch midway to Hankow. Such a line will open this great mineral district to aggressive development. Commercial development of the mineral resources, not to mention the social and economic welfare of the inhabitants, will suffer severe damage if practical measures are not taken from the first to combat hookworm infection in this locality. The well-known menace of this disease in mining and industrial regions elsewhere in these latitudes, the extreme difficulty of eradicating it from deep mines, especially where the climate is such as here, and finally the fact to be developed in this report of the high rate of incidence of an *ancylostomiasis* in the Ping Hsiang Colliery together with its presence to a lesser degree throughout this section, these things together make the question of hookworm infection of central China mines is a problem of the most pressing hygienic and economic concern.

METEOROLOGY.

Accurate meteorological measurements for the entire year at the Ping Hsiang Colliery are not yet available but for February, March and April, 1914, the period immediately preceding and including this investigation, careful records were kept. The average annual rainfall is about 750 mm., the maximum amount falling between February and June. From September to December there is practically no rain. The table of average thermometric and barometric measurements on the next page is compiled from the figures of Mr. Esterer of the Colliery Engineering Staff.

It thus appears that in spite of the fairly low average temperature for the three months of 12.7 degrees, the humidity is very high, a factor of no inconsiderable importance in the propagation of hookworm and other parasitic affections. During these months rather high maximum figures occurred, which again favors parasitic development. The minimal temperatures, which contribute largely to the low average temperature, were

not long sustained and their temporary nature would have small inhibiting effect on parasitic organisms. As February and March are the first two months of the rainy season, high humidity is to be expected but while this helps to explain the atmospheric moisture, it does not diminish its effect on the development of the hookworm and other parasites. For the period included in these observations, the amount of sunlight was about 35 per cent. of the maximum possible if every day had been clear. This was a factor in preventing higher temperatures as well probably as in raising the humidity.

	Thermometer.				Barometer.				
	Dry scale.		Wet scale.		Per cent. rela- tive degree of humidity.		Mm.		
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	
February.....	Max.	15.0	21.2	14.0	19.5	93.5	90.0	769.0	759.4
	Min.	4.3	4.9	3.6	4.1	68.5	54.9	748.0	752.4
	Av.	8.1	10.9	7.7	9.1	85.8	78.3	757.2	756.3
March.....	Max.	21.8	29.0	17.5	21.5	95.5	95.3	764.0	762.5
	Min.	4.0	4.0	3.5	3.3	65.3	41.6	741.0	735.3
	Av.	11.4	15.0	10.7	9.0	86.6	75.1	754.3	750.0
April.....	Max.	25.6	27.0	20.0	23.0	91.0	90.2	763.2	761.2
	Min.	4.2	4.6	3.5	4.0	57.0	54.5	748.1	745.0
	Av.	13.8	17.1	11.8	13.5	79.7	73.2	755.6	755.3
General Average		12.7		10.3		79.7		754.7	

Note: All temperatures are on centigrade scale.

WATER SUPPLY.

The distribution of the water supply of the colliery may be divided among the following heads: 1. Water used in technical processes in the coal-washing plants, which is used over and over again and requires an hourly addition of 5 cubic metres of fresh water. 2. Water used in the coolie bath and boarding houses, amounting to 8 cubic metres per hour. 3. Water used to quench the red-hot coke as it is removed from the ovens, amounting to 5 cubic metres per hour. 4. Feed water for the boilers of the power plant amounting to 16 cubic metres per hour. 5. Water used in the European house for domestic purposes, amounting to .8 cubic metres per hour, giving a total of 34.8 cubic metres of water used hourly above ground by the colliery.

Strange as it may seem, the mountains surrounding An Yuen do not afford available springs or streams from which this large amount of water

may be drawn. The surface waters are used for the paddy fields and no provision exists for gathering and storing rain water. The entire water supply is therefore taken from the mine. As described elsewhere, the further and higher levels of the mine drain off the water which accumulates in the comparatively shallow native mines on both sides of the range. Practically all of the mine water is from this source, as it is only in the general localities where coal-seams outcrop that the levels and drifts of the deep mine approach the surface, and it is also in these localities that all the native mines are sunk. Hence the surface waters very largely drain into the native mines and not directly into the drifts of the larger colliery. The geologic arrangement of the strata of the coal-bearing range likewise tends to make the native mines an intermediary agent in collecting surface waters and draining them into the colliery. The native mines pierce the superficial clay strata which parallel the surface and so lead the water to the out-cropping coal seams immediately beneath. Thus practically all the water in the colliery is derived from that collected by the native mines.

Sanitary conditions are not found in the native mines. The temperatures range very high in them, averaging from 30 to 35 degrees centigrade, due to the small calibre of the shafts, the single bore, the entire lack of ventilation, and the large number of people working in them. Practically every one of the 200 and more native mines in South Hunan and Kiangsi, which furnish the basis for these statements, had at some part a water depth of from 6 to 18 inches through which every coolie must walk every time he entered the mine. Very frequently the calibre of the drift is so small as to necessitate crawling and sliding with a liberal application of dirt and mud to hands, face and neck. The entrance shafts are not vertical but inclined at an angle of from 20 to 40 degrees following the inclination of the coal seam. To allow passage through them a narrow wooden or bamboo ladder is fastened on the earth of the floor of the incline. The rungs of these ladders are characteristically Chinese in their close placement, each step being only from 6 to 10 inches. The ladder is fastened snug against the wet clay floor of the shaft and the coolie tramps heavily up and down at each step pressing his foot firmly into the warm mud under the ladder rung, and dragging after him a basket filled with earth or coal, which slides along the upright side pieces of the ladder. These features of the native mines and their relation to the Ping Hsiang Colliery are discussed in detail for two reasons. First, is their important and intimate bearing on the question of water supply and hookworm infection of the colliery. Second, is the very grave question of the degree of incidence of the hookworm in the native mines and the very serious problem of its eradication there. It will not be possible to eliminate hookworm infection from central and southern China so long as such ideal culture beds as these native mines are left as constant and productive foci of infection.

There is every reason to believe that in the native mines the incidence of ancylostomiasis is very heavy. The close relation by drainage between these mines and the large colliery, and the fact that practically all the water in the colliery is from this source, suggests the probability of a constant fresh infection of the colliery from the native mines as well as a constant pollution of the mine water of the colliery from fecal and urinary contamination in the native mines. Further investigation of this point would be a reasonable procedure.

The water of the colliery is not only subject to chemical, bacterial and entozoal contamination at its source, but it suffers most serious pollution in the colliery itself. At least 2,500 coolies are constantly at work underground, and their urine and feces are indiscriminately and quite thoroughly spread through the mine. Especially in the upper and wetter levels is this of the utmost importance because the water and soft mud on the floors of many drifts are being constantly churned by the bare feet of hundreds passing. The fecal material is thus intimately mixed with the thin mud and widely distributed even outside the mine by the mud adhering to the coolies' feet and clothing. In view of the darkness and high temperatures, a more ideal arrangement for the propagation and dissemination of the hookworm and similar affections could scarcely be conceived.

The chemical condition of the mine water is shown in the table on the following page giving a complete chemical analysis of the waters from the main adit, and from the shaft, compared with the figures for an average normal drinking water.

As would be expected the total hardness of the water is high—between two and three times the average normal. It is to be noted that the magnesia fraction of this total hardness is especially high and clinical experience bears out the theoretical conclusion that, used for drinking purposes, this water predisposes to diarrheal conditions especially in new-comers. In the tropic heat of summer this might well increase the danger from dysentery and typhoid germs, pathogenic amœbæ and other intestinal parasites. The high proportion of chlorine and the presence of nitrates and traces of ammonia clearly indicate urinary and other organic contamination. These substances naturally are not dangerous in themselves but their presence strengthens the probability of accompanying dangerous chemical and biologic bodies.

Referring again to the uses to which the mine water is applied it is evident that in its employment in technical processes the only sanitary danger is incidental. The chance for infection with hookworm lies chiefly in the accumulation of more or less wet coal-dust and mud on the floors on which the bare-foot coolies are at work and in the hand labor of picking extraneous matter from the coal as it passes along an inclined chute. In the use of the water in the coolie bath and boarding houses and in the hos-

pital a much more serious situation appears. The bath and boarding houses are described in a later paragraph. The infected and dirty water from the mine is in part heated before being sent into the bath-houses, so that it is improbable that many hookworm larvæ are brought in by the water supply, but all unheated water may with reason be subject to suspicion.

The same holds true for the use of mine water for bathing purposes in the hospital and also for its use for domestic purposes in the houses of the foreigners. It is improbable that the affection spreads to any extent through drinking water. The Chinese drink almost no water and in the preparation of the omnipresent tea the water is boiled, a fact that without question has made no small contribution to the longevity of the race. The foreign staff, too, uses drinking water with the utmost moderation and while this is not universally boiled as it should be, the meagre quantities used minimizes the dangers of hookworm infection. The fact that of the foreigners examined, only those were infected whose work took them

WATER ANALYSIS BY MR. ESTERER.

Calculated as grams per litre.

Item.	Shaft water.	Main adit water.	Pure drinking water.
Total residue.....	0.8361	0.5442	
Residue after boiling.....	0.6703	0.4345	
Suspended matter.....	0.0503	0.4122	0.
a. Organic.....	0.0123	0.1941	
b. Inorganic.....	0.0380	0.2181	
Silicic acid.....	0.0160	0.0160	
FeO and Al ₂ O ₃	0.0038	0.0028	
So ₃	0.5429	0.1475	0.0600
Chalk (CaO).....	0.2160	0.2476	} See hardness
Magnesia.....	0.1501	0.0993	
N ₂ O ₃	0.0003	0.0001	0.0000
N ₂ O ₅	0.0006	0.0005	0.0200
Ammonia.....	0.0000	Trace	0.0000
Chloride.....	0.0148	0.0174	0.0010
Permanganate-binding.....	0.0136	0.0089	0.0600 to 0.0100
Permanent hardness.....	19.2 degrees	8.2 degrees	
Temporary hardness.....	14.7 degrees	22.4 degrees	
Total hardness.....	33.9 degrees	30.6 degrees	8 to 12 degrees
Reaction.....	Neutral	Neutral	
Odor.....	Stale	Stale	
Appearance of filtered water....	Slightly yellow	White-clear	

constantly into the mine, tends to show likewise that drinking water infection is uncommon to say the least. However the possibility of such infection is certainly present as well as that of typhoid, dysentery and other diseases. A new water system is now being installed which will secure water from a purer source and store it in a screened and locked reservoir from which it will be piped to each house. All of the water for drinking and bathing alike for foreigners and Chinese will pass through coke filters and will undergo a softening process which will in large degree eliminate the dangers of the present water supply.

GENERAL LAY-OUT OF THE MINE.

As has been stated, entrance to the mine is twofold—by way of the main adit going straight and horizontally into the mountain from the floor of the valley, and by way of two shafts, 300 and 500 feet in depth respectively. The shaft division is the part originally worked and is smaller in extent and output than the section tributary to the main adit. It includes only the deeper parts of the coal seams below the level of the valley and the main adit. The bulk of the mine, reached through the main adit, is above the level of the valley floor, and comprises four levels above the main level, each with its numerous lateral drifts following in each seam. The fourth level is near the summit of the range and egress could easily be obtained from it at many points.

The main adit is 2,500 metres in length and is traversed by a double and in some parts a sextuple tracked electric tramway, which incidentally is the oldest electric railway in China. The coal seams are in three groups which are successively pierced at right angles by the main adit. These groups are parallel and are inclined at an angle of 20 degrees to the main adit. Where the adit pierces the nearest and thickest group of seams, is the junction with the main level of the mine which runs in the seam transversely to the adit, with lateral drifts following the seam up and down according to its inclination. This main level is 2,000 metres from the entrance to the mine. Five hundred feet further is the third group which has been worked out.

The seams are thus all transverse to the main adit and inclined upward and away from it at a 20 degree angle. Lateral inclined drifts from the main level and its branches in each seam follow upward in each seam for about 120 metres where it reaches the first level, which runs horizontally in the seam parallel to the main level and in turn has lateral inclined drifts following upward in the seams to the second level. So the plan continues to the fourth and highest level. The average absolute difference in altitude between adjacent levels is about thirty metres.

As practically all the work is done by man labor, these numerous steeply inclined drifts through which materials must be carried assume considera-

ble importance from the abundant moisture, the omnipresent dust and mud and the fact that hands, arms and even head and neck are of necessity brought in contact more or less with the mud and water. This is true for the foreigners, too, and opens a possibility for hookworm infection through the skin of hands, neck and face, even when the feet are well shod.

Below the level of the adit and main level are two deep levels communicating with the main level, but with haulage ways tributary to the main shaft. The mine ventilation is surprisingly good so far as oxygen supply is concerned, there being few points where lamps do not burn freely. The ventilating system depends on the liberation of compressed air which is piped throughout the main drifts, and on the maintenance of a powerful suction of air into large furnaces in two widely separated parts of the mine, whose flues lead to the surface. The ventilation is controlled by the usual system of air-compartments and doors. In spite of the frequent difficulty with mine fires, coal-dust and mine-gas, the system is effective. To it is due the fact that the average temperatures of the mine are not higher. In the lower levels the temperature averages between 23 and 24 degrees centigrade. As the altitude of the levels increases, the temperature rises to some extent until in the upper levels it ranges from 27 to 29 degrees centigrade. For reasons already presented the higher levels are also the hotter ones. Thus moisture and temperature increase together, a condition which would be expected to determine a higher degree of hookworm infection in the upper levels of the mine. As a matter of fact such an increased incidence was not found, but the infection was apparently distributed with considerable uniformity throughout the underground works. This is easily explicable in the light of the following facts. The long period in which the mine has been operated and the frequent shifting of coolies from one part to another, would tend to equalize the incidence. Then too the natural and very rapid drainage from the higher to the lower levels, from which the water is pumped out, unquestionably has an important rôle in carrying the infection from the higher and more favorable levels to the lower sections.

Above ground is an extensive plant also, which includes several units. The coal from the mine goes directly to the two washing plants where it is cleaned, sorted and graded, and where all of the dust is separated for the preparation of coke. The important sanitary features in these buildings from the present standpoint are the imperfect lighting, the apparent necessity for hand-picking of the wet coal and the accumulation of dirt and moisture from the coal as it goes through the building. That these points are not without significance is shown by the fact that a considerable degree of hookworm infection was found here, the incidence being about two-thirds that in the mine. A contributing factor is however found in the occasional interchange of coolies between the mine and the washing plants,

and in the fact that the coolies from the washing plants live in the boarding houses and use the baths of the mine coolies.

Next to the washing plants are the coke ovens and here the only factors favoring dissemination of the infection are the custom of the coolies of using their feet in pushing the wet coal dust from the tram cars down into the ovens, and the fact that in quenching the glowing coke after burning, the coolies stand bare-footed or lightly sandalled in the water as it runs back into the drains. This latter condition is insignificant and the former is easily susceptible to remedy.

The machine shops, foundry, carpenter and pattern shops, smithy, car construction house, and steel-working shop are of considerable size and offer certain facilities for the spread of ancylostomiasis. Chief of these may be mentioned the dirt which adheres to pieces of machinery such as pumps, engines and gearing brought from the mine for repair. This dirt is a potent source of hookworm infection in the shop employees who handle these largely by hand and without any preliminary washing or cleaning. This is the chief etiological factor undoubtedly in the moderately high incidence found in this class of workmen. None of these men live in the company boarding houses. Few if any of them have previously worked in the mine. The shops are across the railroad tracks from the washeries and other colliery buildings, and there is little intercourse between the two sets of employees. Then, too, the proportion of a better class of workmen is higher as the work is more technical, demands greater skill, and is accordingly better paid. The result is a higher scale of dressing with shoes more constantly worn, and a minimum of strictly coolie labor. Viewed with consideration of these circumstances, the infection rate is surprisingly high, and apparently indicates a more general distribution of the hookworm outside of the mine proper, and even of the colliery.

The nature of the work, the conditions under which it is done, and the better character of employees necessary to perform it, decrease greatly the degree of infection in the power and compression plants, the offices, magazine and hospital. In these units the disease occurs chiefly in those whose work takes them at times into the mine. The living conditions of the foreign staff are admirable alike from a sanitary as from an æsthetic standpoint. Their dwellings are placed well up on the mountain side with no cultivated land above or back of them, and with free drainage from the steep slope. The installation of the new filtered water system will even increase the present excellent health conditions and still further reduce the danger from water-borne diseases.

The coolies from the mine and above-ground units exclusive of the shops, live in large boarding houses which are owned and operated by the company. The average expense to the company per man daily for board and lodging is 8 cents Mex. This, as also the oil for lights in the mine, amount-

ing to $4\frac{1}{2}$ cents per 12-hour shift for each man, is furnished by the company in addition to the wages paid. The wages vary from 30 to 40 cents Mex. per day with the nature of the work. There are three large and eight small boarding houses. The large ones are two-story brick structures divided on each floor into large rooms each with a pair of windows at the outer end and the hall door at the opposite end. The sides are lined with tiers of very wide and spacious bunks, 24 in all and each room accommodates 48 men, of whom half work on night shift and half on day shift. Between the bunks is space for tables, chests and stools. From each room one man is detailed to bring from the kitchen the food for the entire group of 24 men, which is eaten in this room. The latrines and baths are in separate buildings.

The conditions in the boarding houses are far from ideal especially in regard to light and air, although on the other hand they are a vast improvement over the conditions under which the coolies would live outside. From a sanitary standpoint, lighting and ventilation are inadequate, the brick floors and walls wear badly, and the general brick construction is unsatisfactory. But the bunk-rooms and boarding houses present no features of special importance for the propagation of the hookworm.

Outside of the large bunk-houses are small brick structures used as latrines. The Oriental habit of the people precludes the use of any western toilet seat, as even when it is provided, the coolie merely squats on top as he has done for ages immemorial and the seat receives more or less of the material intended for the receptacle beneath. The most feasible form of latrine is the one here provided. The floor space of the building is occupied by a brick-walled pit about seven feet in depth, across which are laid heavy planks a foot in width with an interval of some ten inches between. This arrangement reduces to a minimum the soiling of the coolies' feet and clothing with fecal matter, and the level of the planks is above the range of splashing. On the side opposite the entrance, the pit extends perhaps a yard beyond the wall of the building, and to this place come the farmers with their buckets and carry away the material for the fields.

While the arrangement of these latrines is admirable so far as it concerns the danger of spreading hookworm infection among the mine coolies, there is another equally important feature which is not so fortunate. The mixture of feces and urine does not remain long in the latrine but is quickly carried away to the paddy and vegetable fields in the valley. The common pit affords an excellent means of thoroughly mixing the feces from highly infected cases with that from the non-infected, and the result is a uniformly heavy infection of the material which is carried away by the farmers. Thus there is a constant and large stream of hookworm infection from the mine distributed broadcast through the agricultural sections. Not only are measures in order to free the colliery from hookworm im-

portant but it is of the utmost sanitary importance that no source of infection be left open from the mine to the outside country.

Two bath-houses are provided in each of which several hundred men can bathe at once. Especially at the hours when the shifts change these houses are crowded. Their size and ventilation are fair but increased window space is needed. The flooring is of brick with the usual disadvantages of irregular wear and permeability. Across the full width of the floor run parallel brick-lined trenches, each about 2 feet wide and 2 feet 6 inches deep with an interval a yard wide between. These trenches are filled with warm water supplied through small pipes placed just below the surface of the water. The outlet is merely an overflow gutter situated quite close to the inlet. The result is practically no circulation of water in the trenches and the accumulation of an enormous quantity of dirt from the hundreds of bodies begrimed from head to heel with coal dust and mine mud. The quantity of dirt is materially increased, too, by the custom of the coolies of washing their clothing and shoes or sandals in the same water. The excellent chances afforded for disseminating hookworm and other infection is apparent. This system was inaugurated when the coolies wore long hair and a queue but in the days of the republic coolie heads are close cropped or shaven as a rule, and the former objection to shower baths is not so valid.

The kitchens are in good sanitary condition, the food is well-cooked, of suitable variety, and sufficient quantity. The food served here can be excluded as a source of hookworm infection. This does not however hold true in the mine where the coolies eat their midnight and midday meal, and where mudstained hands and dirty clothes used to wipe out the dishes may easily infect by ingestion. The general location of the boarding houses is excellent, on a fairly steep mountain slope, on sandy soil with good drainage, and exposed to a strong and fairly constant breeze.

INCIDENCE OF *ANCYLOSTOMUM*.

In these examinations ordinary smears were made covering about three-fourths of a 1 x 3 inch microscopic slide. No cultural or concentration methods were employed nor was any record kept of the results of treatment. In those cases which were treated, thymol was used in the manner recommended by Stiles for the Rockefeller Sanitary Commission. In all those cases in which examination was made for the worms the *ancylostomum duodenale* was found. Stitt (*Practical Bacteriology and Parasitology*, 1913, p. 266) quotes the claim that where the ordinary microscopic examination for ova shows 40 per cent. infection, and concentration methods 55 per cent., cultural methods will show 99 per cent. infection. This should be recalled in the light of the figures presented here.

In the course of this study examination was made of 272 persons, of whom 225 were workers in the underground section of the mine, 19 were from the washing plants, 11 from the machine shops, 11 from the foreign staff and families, and 6 were from the valley outside the colliery. Table A shows the result of this examination. Of the 225 coolies from the entire underground works, 90.2 per cent. were found infected with hookworm, 64 per cent. with *ascaris lumbricoides*, and 8 per cent. with *trichocephalus dispar*. In no case after the hookworm ova were found was the search continued for other parasites. The figures for *ascaris* are therefore minimal and there is reason for believing that *ascarides* were actually present in from 95 to 100 per cent. No relation was found between infection with *ascaris* and with hookworm. The different sections covered the entire range of the mine in temperature, moisture and elevation, yet there is no significant difference in the percentage of infection, the range being from 100 per cent. in 9 sections, to 66 per cent. in the third shaft section. This latter low ratio is based on a total of but three cases and cannot weigh as an absolute figure. In those sections from which ten or more men were examined, the lowest incidence was 73 per cent. It is to be remembered also that in none of the cases reported negative, was the search extended beyond three slides and thirteen minutes. In view of the high ratio in many sections and the probability of and facilities for a uniform infection throughout, it is certain that the figures here presented are minimal, and it is most probable that corrected figures would be much higher throughout.

In the light of the points recorded in describing the above-ground units of the colliery, it is interesting to note in the washing plants an incidence of 50 per cent. and in the machine shops an incidence of 27 per cent.; figures which harmonize closely with conclusions drawn from the study of sanitary conditions in those units. Of the 11 members of the foreign staff and their families examined, three, or 27 per cent., were infected. These three were engineers whose daily routine required the supervision and inspection of underground work. No case was found in a foreigner who did not regularly visit the mine. Of the six cases examined from outside the colliery, two were infected. This proportion would be expected to hold for much larger numbers, as the chances for infection spreading from the mine to the surrounding country are abundant. These chances lie chiefly in the migration of infected coolies from the mine to other occupations outside, the use of infected sewage from the colliery as a general agricultural fertilizer, and the transportation of infected mud from the mine by various means. Of the entire 272 persons examined, a total of 222 or 81.6 per cent. were found infected with hookworm. Of the 36 persons outside of the mine proper, exclusive of the foreigners, 16, or 44 per cent., were infected.

TABLE A.

Section of colliery.	Total no. examined.	Hookworm positive.	Per cent.	Ascaris l. positive.	Per cent.	Tricho- cephalus.
Main Adit No. 1.....	10	10	100	8	80	
Main Adit No. 2.....	5	4	80	4	80	1
Main Adit No. 3.....	10	10	100	6	60	
Main Adit No. 4.....	15	14	93	6	40	2 Oxyuris 1
Main Adit No. 5.....	25	25	100	18	72	4
Main Adit No. 6.....	19	19	100	14	73	2
Main Adit No. 7.....	28	24	85	17	60	2
Main Adit No. 8.....	9	9	100	6	66	
Main Adit No. 9.....	15	11	73	10	66	1
Main Adit No. 10.....	1	1	100	1	100	Amœba 1
Main Adit at large....	21	16	76	15	71	1
Shaft No. 1.....	3	3	100	2	66	
Shaft No. 2.....	3	2	66	2	66	
Shaft No. 3.....	11	11	100	8	72	
Shaft No. 4.....	4	4	100	2	50	
Shaft No. 5.....	11	10	90	9	81	Ascaris C. 1
Shaft at large.....	13	10	77	10	76	
Mine at large.....	22	20	90	7	33	
Totals for mine.....	225	203	90.2	145	64	18.8 per cent
Washing plants.....	19	11	57	14	73	1
Machine shops.....	11	3	27	10	90	
Outside.....	6	2	33	3	50	1
Foreigners.....	11	3	27	0	0	
Grand total.....	272	222	81.6	172	63	20.7 per cent 3 Unidentified

In the case of routine examination, one case each was found to harbor oxyuris, ascaris canis, and amœba. Three unidentified ova were observed. A rich field is here for the study of rare entozoa.

A study of the clinical effects of ancylostomiasis in the mine coolies presents many difficulties. The general physical average is far below a similar average for European or American miners and where the European miner averages one ton of coal per day output, the Ping Hsiang miner averages less than half this amount. Practically all of the coolies show some physical abnormality. The average coolie is undersized, short, under normal weight for height, pallid, stooped and unsymmetrically developed. This general poor physical condition cannot be laid at the door of the hookworm, because the mine coolies are constantly being recruited from the farming districts of the provinces close by, and are presumably not infected in a

large proportion when they come to the colliery, and also because a similar proportion of poor physique is found elsewhere and in other strata of society. Complete physical examination and measurements were made by the physical department of the Yale College in China of 112 students between the ages of 14 and 21. These men were drawn from the best Chinese families and are presumably the best physical stock that central China can produce. Among them no hookworm was found, yet 25 per cent. showed poor general physical condition, 53 per cent. fair, and but 22 per cent. were in good condition. The system was the same as at Yale University.

The hookworm alone therefore cannot be charged with entire responsibility for the very poor general physical condition of the coolies of the colliery. That the disease is, however, a strong contributory element, admits of no doubt. It is unnecessary here to discuss in detail the influence of hookworm infection on concurrent and sequent disease conditions and on economic efficiency. Suffice it to say that a considerable proportion of the invaliding at the colliery must be due indirectly to this cause. Pulmonary tuberculosis is here as always the scourge of China, and the readiness and speed with which it develops and spreads are explicable in the light of the hookworm incidence. The weakened vitality and lowered threshold of infection due to ancylostomiasis not only cut down the daily output of coal per man but they pave the way for an extremely high rate of disease incidence and mortality. A consideration of no mean importance is the havoc which epidemic disease would make should it once gain a foothold under such circumstances.

In spite of these indubitable facts, Table B shows that exactly the same percentage of the 77 cases examined from the colliery hospital were infected with hookworm as of the 187 cases examined directly from their work in the colliery. In each case the incidence is 80 per cent. This fact is not to be explained by the assumption that hookworm disease has no direct

TABLE B.

	Total examined.	Hookworm.	
		Positive	Per cent.
Hospital	77	62	80.5
From work	187	151	80.7

influence in determining a higher disease incidence, but rather indeed by the supposition already referred to, that in the underground works the infection is nearly if not quite universal and hence no valid comparison is

possible between hospital patients from the mine and the coolies actually at work in the mine with regard to their relative infection with hookworm. Rather a comparison must be drawn between the incidence of disease in general among the mine coolies and among a corresponding group of farmers, artisans and tradesmen outside the mine, in relation to the hookworm as a predisposing factor. The incidence of disease in general in the miners is distinctly higher than outside but exact comparative figures cannot now be given.

TABLE C.

Infection by Ages.			
Age.	Plus.	Minus.	Per cent. plus.
Less than 10.....	0	1	
10-19.....	16	4	80
20-29.....	90	19	82
30-39.....	81	10	89
40-49.....	24	7	77
50-up.....	5	1	83

TABLE D.

Native town.			
Town.	Positive.	Negative.	Per cent. positive.
Ping Hsiang.....	101	12	89
Siangtan.....	45	9	83
Liling.....	40	8	83
Hupei.....	27	7	80
Liuyang.....	29	3	90
Hengshan.....	7	2	77
Changsha.....	7	1	87
Scattered.....	10	6	62

In Table C is shown the incidence of hookworm disease by ages, each decade being grouped separately. No significant variation is found nor is there any reason here for regarding age as influencing at all the relative degree of infection. The same may be said of Table D, showing the incidence according to the native towns from which different groups of coolies come

The important factor is not the precedent condition or place but it is simply the fact of employment in the mine. Table E shows the relative incidence according to the length of employment in the mine and again no conclusions can be drawn as the figures are on the whole comparatively uniform and show no relation between length of employment and infection. Even in the first month positive cases appear and this might be assumed to support the view that ingestion of the ova in the mine with the food is a common and frequently repeated proceeding. These tables all indicate that a detailed and complete cultural examination would show an almost universal underground infection.

With the exception of three cases in which three slides were prepared, only one or two slides were examined. Of the total number of cases examined, 77 per cent. showed hookworm ova on the first slide and on the first slide were found 95 per cent. of all the positive cases (Table F). On the second slide 3.6 per cent. of all examined were positive, and 4.4 per cent. of all the positive cases were on the second slide. Remembering the customary infrequency of hookworm eggs in positive cases examined by this method and the fact that in none of these cases was a preliminary purgative employed, it is apparent that the infection must be heavy in a majority of the cases. Stiles recommends the examination of ten slides, taking one hour for the task before a definite negative opinion can be given. Here the indications are that such a procedure would have given a percentage positive approaching very near 100.

TABLE E.

Time in colliery.			
	Positive.	Negative.	Per cent. positive.
1 month.....	4	0	100
2 months.....	11	2	84
3 months.....	8	2	80
4 months.....	1	5	16
5 months.....	3	0	100
6 months.....	5	0	100
1 year.....	16	6	72
2 years.....	28	5	84
3 years.....	34	4	89
4 years.....	7	4	63
5 years and over.....	101	12	89

TABLE F.

Slides examined.			
Slide number.	Positive.	Negative.	Per cent.
1	212	5	95 per cent. of all positive 77 per cent. of all examined
2	10	43	4.4 per cent. of all positive 3.6 per cent. of all examined
3	2	1	

Reviewing the number of minutes per examination necessary to find the first hookworm egg (Table G), it is seen that in one out of every ten cases, an egg was in the first field brought into focus. The largest percentage, 32 per cent; were found within one minute and 83 per cent. were found within five minutes. In no case was the search prolonged beyond thirteen minutes.

TABLE G.

Time of examination.			
Minutes.	Positive.	Negative.	Per cent. of total positive.
0	22	0	10
1	49	0	22
2	37	0	17
3	40	0	18
4	18	0	8
5	12	0	6
6	11	1	4
7	11	0	4
8	3	3	1
9	6	6	2
10	8	13	4
11	3	11	1
12	3	14	1
13	0	3	0

OTHER DISEASE FACTORS IN THE MINE.

Certain other disease factors are present in the Ping Hsiang Colliery whose importance lies not so definitely in the propagation of *ancylostomum* as in other lines. Here may be cited the innumerable rats which infest the mine. All of the underground passages require heavy timbering, and where drifts are directly in the coal seams, a layer of pine twigs, ferns and straw is placed directly against the coal and sand to prevent the dust from drifting in and starting excavations of increasing size. This fine brush is supported by the timbering and furnishes first-rate nesting facilities for the rats. The rats exist in enormous numbers. The moisture, darkness and warmth are favorable to them and they subsist on the innumerable cockroaches, the leavings of the coolies' food and the fecal material. The rat question would assume primary importance in the event of the introduction of plague, and here where this danger is always to be feared, rat eradication should be among the earliest sanitary measures to be inaugurated.

Numerous ants worry the miners and large scorpions are found although stings from the latter are seldom reported. Worthy of special investigation is a peculiar dermatitis which is of comparatively frequent occurrence among the mine employees and which is ascribed to contact with the water in certain sections of the mine. The causation is quite unknown although a chemical irritant is probably at fault. As the coolies leave the mine they come from the various hot and humid laterals to the electric tramway of the main adit, which carries them at a high speed for the 2,000 and more metres to the surface. The coolies are half-naked, tired with a long twelve-hour shift and over-heated. The chilling from the fast ride to the surface easily conduces to decrease their body resistance and predisposes to respiratory and enteric affections. In many of the hotter drifts the coolies work naked and practically everywhere they are barefooted or at most shod with rough straw sandals. Thus every opportunity is afforded for the hookworm larvæ to penetrate the skin, not alone of the feet and hands but of the entire body. No particular attention is attracted by ground-itch or analogous conditions but the great frequency of eczemas, furunculosis and minor ulcerations strongly suggests that many of these latter conditions may conceal or spring from a precedent larval puncture of the skin. Again the extremely large number of cut and contused hands and feet affords great chance for larval entrance.

RECOMMENDATIONS.

There can be no question of the desirability from the standpoint of the company and the coolies, as well as of the surrounding country, of eradicating hookworm infection from the Ping Hsiang Colliery. In the way, however, of accomplishing this eradication are certain difficulties hard or im-

possible for one to appreciate who is not familiar at first hand with local Chinese conditions. These difficulties may be briefly capitulated as follows. Money for sanitary improvement is sadly lacking in China today and only definite proof of definite financial advantage is apt to evoke it. Human labor and life are the cheapest commodities purchasable in the open market and there is no public sentiment, and but little private, tending toward a better state of affairs. The foreign staff at the colliery will use every means at its power to improve sanitary and social conditions among coolies but it remains to be seen what can be accomplished against the conservative and indifferent *laissez faire* of the Chinese officials. The company is not in sound financial condition and money for sanitation is therefore the harder to expect.

Again the Chinese coolie and his guild are a law to themselves and with the profound and supercilious scorn of complete sanitary ignorance, regard with indifference, derision or suspicion much of what is attempted in the way of sanitary improvement and health conservation. Conditions would be easier if the company could control its employees and force them to follow instructions. Unfortunately this happy condition does not obtain and outside of the actual mining operations, the company has only nominal control. In view of these circumstances therefore, sweeping changes are out of the question, and the problem must be approached absolutely from the standpoint of what is practical and really possible. Sanitary reform in China is a matter of generations and the eradication of hookworm disease from the deep mines in general and from the Ping Hsiang Colliery in particular, will be no whit easier than the same job has been in the mines of western lands, but on the contrary far more difficult and time-consuming. The following recommendations are made with the above sketched conditions sharply in mind, and after deliberate consideration of the various possibilities.

1. Education is necessary at two points. (1) Education of the head-men of the gangs and sections of the mine. This should take the form of the presentation in informal lectures of the nature and cause of hookworm disease, its economic and individual significance, its history in other lands, and the means of curing, preventing and eradicating it. These lectures should be accompanied by lantern pictures illustrating every point discussed. The lecture system should be accompanied and followed by a direct appeal to the head-men to coöperate with the company in the effort to eradicate the disease, and their coöperation should be made practical by making them responsible for the institution of the measures hereafter described. (2) Education of the coolies by simpler illustrated talks given in the barracks by Chinese assistants, and by distribution of printed matter stating in very plain language what the disease is, how it spreads and how it may be prevented and cured.

2. Division of the mine into about thirty sanitary districts with the native head-man over each responsible for carrying out certain definite procedures in it. Each mine section could be divided into two sanitary sections with the regular native officials in charge as sanitary officers. About five sanitary sections should be combined under a higher official who would act as general sanitary inspector with general supervision over his district. The sanitary inspectors should report to and be directly responsible to the foreign mine physician for the sanitary condition of their respective sections. The mine physician should coördinate and regulate the sanitary measures taken throughout the mine.

3. Posting of numerous plainly-worded Chinese bulletins on hookworm disease, at all points in the mine where coolies congregate, in the boarding houses and other effective places. Posting in the mine as well as in the boarding houses of the definite rules described in the next section.

4. In the mine, buckets should be placed at frequent intervals for feces and urine, and the use of these alone should be strictly enforced by the sanitary staff. Frequent inspections of every part of the mine should be made by the mine physician with a view to securing strict enforcement of this rule as well as to devise new and special measures for localized conditions. The latrine buckets should have a suitable disinfectant put in them and should be carried out of the mine on special cars twice in each twenty-four hours and emptied into the boarding house latrines, scalded, disinfectant replaced, and returned to the mine. Disobedience of the strict rule against defecation elsewhere than in the buckets provided, should entail a definite fine to be deducted from the pay, and in cases where the particular offender cannot be determined, should be assessed against the sanitary section in which it occurs.

5. A system of regular examinations should be instituted covering all persons enrolled with the colliery. The writer demonstrated the feasibility of examining fifty men per day for hookworm infection with the aid of a properly trained Chinese staff, in addition to supervising the usual routine of the hospital. Even the microscopic work can be delegated to a suitable assistant after a time. All positive cases should receive treatment during the half day they are at the hospital for examination. This would best be conducted by administering Epsom salts to all and examining the resultant stools for ova. Positive cases could then immediately receive half of the total degree of thymol, and two hours later the second half. The final dose of Epsom salts could be taken after returning to the barracks. Each person examined should receive a dated certificate stating the result and whether treatment had been administered. These certificates should be checked up by the sanitary inspectors in the mine, and those not having them should be fined. This system would easily allow a complete round of the employees twice yearly and would afford a most valuable means of eliminat-

ing the disease. All new employees should be examined before entering service.

6. In addition to the required examinations, all infected hospital patients should be treated as well as all persons who apply for treatment in the daily clinics.

7. The same system of sanitary supervision should be instituted in the above-ground units as in the mine.

8. The boarding house latrines should be enlarged, and be made the depository for all buckets and containers of fecal material from the mine and above-ground works. The shape and arrangement of the latrines at present is satisfactory but each should be double, having a solid partition wall extending from the floor of the pit to at least six feet above the ground-level floor. Each side of the house should have its own entrance and the pits should be cement lined. The two sides should be used alternately and never at the same time. During the week or such interval as one side is in use, the opposite side should be closed and converted into a septic tank for the disinfection of the fecal and urinary matter and the destruction of hookworm ova and larva. After such a period as may be necessary to accomplish this, as determined by exhaustive bacteriological and microscopic examinations, the back of the closed pit should be thrown open to the farmers as at present and the entire contents removed. This pit should then be opened as a latrine and the opposite one closed and treated in a similar manner.

9. The bath-houses should be remodelled, the brick floors and trenches being replaced by a cement floor with a concave curve from side to side, and an efficient drainage slope from end to end. Over this should be laid a floor of wooden or metal gratings which could be taken up for scrubbing and scalding at frequent intervals, permitting also thorough flushing and cleaning of the underlying cement. Water should be supplied at a definite temperature from overhead pipes. Low wooden benches can be placed under the showers if desired and clothes racks around the walls.

10. Machinery taken from the mine to the shops to be repaired should be thoroughly washed before leaving the mine.

11. Accurate statistical and progress records should be kept by the mine physician covering every phase of sanitary activity.

CONCLUSIONS.

1. The geographical location, geological formations and meteorological conditions at the Ping Hsaing Colliery are decidedly favorable to hookworm infection.

2. The native mines, from which the water supply of the colliery is drained, are undoubtedly heavily infected, and are a potential source of danger to the colliery, and probably an actual danger. Investigation of the

conditions affecting hookworm infection in the native mines is urgently necessary.

3. Conditions in the underground works of the colliery are highly favorable to the propagation and dissemination of hookworm infection, in the particulars of excessive moisture, high temperatures, darkness, constant re-infection by promiscuous defecation, the habits and clothing of the coolies, and the lack of special provisions for sanitary control.

4. Examination of 272 persons showed a general incidence of 81.6 per cent. Of the 225 who worked underground, 90.2 per cent. were found infected. The ratio of incidence was much less in the above-ground works and the infection was also found present entirely outside the colliery.

5. Evidence is deduced indicating that the 90.2 per cent. infection in the mine is a minimal figure and that the true figure approaches 100 per cent.

6. The only factors determining the rate of incidence are conditions in the mine itself.

7. Eradication will be peculiarly difficult and slow but can be accomplished along lines here recommended.

8. This study indicates forcibly the need for intensive investigation of hookworm infection in Hunan, and Kiangsi Provinces, where the disease is apparently a largely unsuspected factor in economic industrial and social inefficiency.

NOTE: The writer is indebted for much of the information presented, particularly in respect of the native mines and the technical features of the Ping Hsiang Colliery, to the kindly and courteous assistance and coöperation of Mr. Leinung, Mr. Esterer, and Mr. Schlifter, of the German Engineering Staff of the colliery.

SANITATION IN BRAZIL.

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Brazil, the vast country south of us, of greater area than the United States (excluding Alaska), has for the past twenty years been undergoing a great industrial development. The agricultural and commercial advantages of the country have been recognized by the Brazilians, Europeans, and, to some extent, Americans, and the southern section of the country has become more and more thickly populated by the influx of immigration and by the development of manufacturing and of the import and export trade.

Large centers of population, such as Rio de Janeiro with nearly a million inhabitants, and the City of Sao Paulo with its half a million people, have become commercial centers of great importance. Consequently, the shipping in such ports as Pernambuco, Bahia, Rio de Janeiro and Santos has had its corresponding increase.

As a result of this, and of the fact that the climate of Brazil, varying from tropical in the north to semitropical or mildly temperate in the south, is favorable to the spread of contagious diseases, Brazil has, in the past, been notorious for its epidemics of yellow fever, typhoid, malaria, dysentery, cholera, and a large number of other infectious diseases. As recently as 1900, ships stopping at Brazilian ports would very often lose the greater part of their crews by the ravages of yellow fever. Europeans, unaccustomed to the climate, and not immune to the various diseases as were the greater portion of the native Brazilians, were stricken in large numbers throughout the country. In fact, every community in Brazil was suffering under a high mortality due to infectious diseases.

The Brazilians, realizing the necessity of extreme sanitary measures, and profiting by the experiments and examples of American and European sanitarians, adopted strict regulations and spent enormous sums for the eradication of epidemics. The principal work of this kind was begun by the Federal district, Rio de Janeiro, and closely followed by the State of Sao Paulo, the most highly developed and progressive state in Brazil; and these in turn by the organization of sanitary commissions in various other states of the Union and by the activities of the municipal boards of health.

THE FEDERAL PUBLIC HEALTH SERVICE.

The Federal Department of Health has jurisdiction over the health of the ports, the quarantine and disinfection of ships or vessels, the sanitation of the Federal District of Rio de Janeiro, and to aid the various State Commissions in their work.

It was not until 1903 that the Government seriously undertook its campaign, at which time the eminent sanitarian, Dr. Oswaldo Cruz, was given full authority, as Director-General of the Public Health Service, to eradicate the diseases which were making the city of Rio de Janeiro the plague spot of the world. The first appropriation was for \$1,700,000, followed by approximately \$1,300,000 each year since.

Profiting by the experiments and observations of Drs. Finlay, Reed, Carroll, Agramonte, Lazear, Guiteras, etc., proving the agency of the



A section of the city of Rio de Janeiro, showing the sea wall and esplanade skirting the edge of the bay, the parks and paved streets of the city. All the buildings are of brick and stucco and all have tile roofs.

Stegomyia Fasciata in the propagation of yellow fever, the extermination of the mosquito was the first thing undertaken. All stagnant and slow-moving water within the city and in the outlying districts was drained by means of canals and sewers; the complete cleaning of the city was undertaken by the razing of all buildings the sanitary conditions of which were questionable, the paving of hundreds of miles of streets by asphalt or granite blocks, the widening of all principal streets, the construction of large wide avenues, and rigid sanitary inspection. A large force of inspectors still visit about sixteen thousand houses per week sealing all open receptacles of water, such as water-closet flush tanks, with paper, on which is written the date and signature of the inspector. They carefully inspect the roof and other gutters and clean out all obstructions to the ready flow of water. They also sweep away with long-handled brooms all cobwebs

occurring in inaccessible spots to exterminate all insects as far as possible. One procedure of attacking the mosquito is of particular interest because, contrary to the usual method employed where the surface of all still water is covered with a layer of oil, all ponds, lakes, marshes, canals, rivers, etc., are provided with large quantities of a small and voracious fish, the "Barrigudo," which devour the larvæ of all species of mosquitoes.

The work of cleaning the city was greatly aided, to a certain extent unintentionally, by the construction of immense docks of masonry and concrete along a large part of the waterfront and by the building of a long granite sea wall and beautiful esplanade along the remainder.

An English company, the City of Rio de Janeiro Improvements Company, was given a concession to install sanitary sewers throughout the whole city, and to install all house plumbing in both old and new buildings.

Sanitary laws were passed providing for the quarantine and isolation of contagious diseases, vaccination, disinfection, inspections of various kinds, strict laws regarding buildings, etc. These are very similar to the requirements of the State of Sao Paulo, and a description later of the laws of this state will, I believe, be sufficient for a general description of the progress that has been made in sanitation in Brazil.

The water supply is now taken from a range of mountains not far from the city. The water is clear, sparkling and free from pollution; and is regularly and carefully analyzed by the Government chemists and bacteriologists.

Rio de Janeiro is now a healthful, clean, and beautiful city. The general mortality from all causes has been reduced over fifty per cent. from the time when yellow fever was prevalent. Good air, good water, proper disposition of the wastes of the community, the extermination of mosquitoes, flies, and as many other insects as possible, excellent sanitary laws, efficient medical inspection of all contagious diseases, publicity of the public health work by the distribution of circulars and by articles in the newspapers almost daily, and cleanliness, have resulted in making Rio a modern livable city which will be an everlasting credit to the progressiveness and ability of the Brazilian people.

THE STATE HEALTH DEPARTMENTS.

The Health Commissions of the various states of Brazil play by far the most important part in the supervision and protection of the public health. A description of the organization, the most important laws, and the results of the Sanitary Service, "O Serviço Sanitario," of the State of Sao Paulo, as the most advanced state of Brazil both in this and in other respects, will be a typical example of the sanitation throughout the country, only perhaps more extensive on account of the greater density of population compared with the other States.

As in Rio de Janeiro, the work of exterminating yellow fever, typhoid, etc. was not seriously undertaken until 1903, although in some cities, such

as Santos, part of the work had been started earlier. At this time large appropriations were made for the work, a strict code of laws enacted, and a large organization formed.

The Act of the State Legislature pronounces the duties of the State Sanitary Commission to be as follows:

1. The scientific study of all questions relative to the Public Health.
2. The study of the nature, etiology, treatment and prophylaxis of infectious diseases which appear or develop at any point in the state and scientific researches along these lines pertaining to the public health.
3. Examinations of the hygienic conditions of a. The Air; b. Water supplies, sewerage, etc.; c. The Ground and the Vegetation.
4. The study of the flora of the state from a therapeutic point of view.
5. The execution of necessary active or protective measures for general hygiene, the sanitary policing of schools, of private and general dwellings, of the sellers of wholesale and retail drugs, factories, all industrial and commercial establishments, all hospitals, market places, slaughter houses, cemeteries, all public places and thoroughfares, for the maintenance of hospitals for infectious diseases, isolation and disinfection.
6. General preventive measures for the public health, especially those protective against transmissible diseases.
7. The recording of the vital statistics of the state, which shall include all the information which can be collected regarding the causes of diseases and deaths.
8. The preparation of cultures, vaccines, serums, antitoxins, etc., and the inspection of the preparation of such products in institutions and laboratories.
9. The supervision of the practise of medicine in all its branches, of pharmacy, dentistry and obstetrics.
10. The examination of wet nurses and the inspection and analysis of their milk.
11. The examination of the infants of the indigenous.
12. The inspection of foods, drinks, especially of wines and mineral waters.
13. The medical inspection of public schools and of pupils.
14. Inspection of all sanitary works and supervision of all sanitary measures of municipalities.
15. The diffusion of the general principles of public health by the distribution of circulars and pamphlets on the laws, regulations, and instructions pertaining to public hygiene.

For the execution of these duties, the Sanitary Service is divided into the following sections, all under the office of the Director-General of the Service.

1. Department of Bacteriology.
2. Chemical Laboratory.

3. Department of Smallpox Vaccine.
4. Disinfection.
5. Demographical Statistics.
6. Pharmaceutical Laboratory.
7. Isolation Hospitals.
8. Lazarettos, Quarantine and Observation Stations.
9. The Serumtherapeutic Institute.
10. Inspection of Wet Nurses.
11. Department of Sanitary Engineering.

The total number of people employed varies between 300 and 500, depending upon the general prevalence of diseases in the state. The grounds, buildings and equipments of the various branches of the Service are spread about the entire state, and offices, hospitals, laboratories, and vehicles of all kinds which are maintained in all important centers, required an immense amount of capital for the original purchase and erection; and the maintenance of these, together with the salaries of the personnel, requires an annual appropriation of about one half a million dollars. This must be acknowledged as remarkable when we consider that the population of the state is but 3,000,000. How many of our states spend \$500,000 a year for the public health!

An expensive, but very important and well-known department of the service is the Serumtherapeutic Institute, the principal duty of which is the preparation of serums for the prevention of death due to snake-bites. Brazil is infested throughout the whole country with large numbers of various kinds of venomous snakes, which have caused a very large mortality in the past. This institution now maintains a large snake farm, receiving snakes from all parts of the country, where the venom is extracted from the fangs, inoculations made upon mules, horses and other animals, and the various serums extracted. The serum is sent free of charge to those who have contributed snakes, and at a nominal cost to others requiring it. This work has met with enormous success.

In addition to the laws covering the various duties and requirements of the above-mentioned departments, a general code of laws is in effect, which the general inspectors or the officers of the different sections of the Service enforce accordingly as the cases come under their jurisdiction. As these laws are very full and complete as to detail, I shall endeavor to describe the general character and some of the more radical of them.

The laws regulating the practise of medicine require strict examination of physicians and surgeons; diplomas from recognized medical schools; registration; standard forms of prescriptions; prohibit physicians and surgeons from selling or dispensing drugs (except in cases where there are no pharmacies within a distance of three kilometers); no partnerships or contracts permitted with pharmacists; require all transmissible cases to be

immediately reported; specify procedures in various cases, violations of either to be heavily fined.

The practise of obstetrics, dentistry and pharmacy are similarly regulated. All pharmacies and sellers of drugs and surgical instruments are furnished with lists of drugs, chemicals, instruments, materials, etc., which they are required to keep in stock at all times.

Schools have strictly enforced regulations. In addition to the medical examinations of the pupils, the lighting, ventilation, etc., must comply with the specifications of the Service. The construction, sanitation and safety



The Serumtherapeutic Institute and Snake Farm.

for employees, in factories and workshops are provided for. For ventilation there must be at least eight cubic meters of air space for each employee, and the ventilation must provide 35 cubic meters of air per hour to each person. No children under 10 years may be employed, and those of from 10 to 12 must be given light work; for night work no one under 18 is allowed; vaccination is required; and one water closet for every 40 males and one for every 25 females.

The laws governing the sanitation of residences and buildings are very strict and rigidly enforced. These come under the jurisdiction of the Sanitary Engineering department of the Service, and all plans for buildings and sanitary works must have the acceptance and signature of the nearest executive officer. In every building, all kitchens, pantries, waterclosets and bathrooms are required to have their floors of masonry construction (preferably of reinforced concrete), covered with terra cotta tiles (no cement tiles being permitted on account of their porosity); and the walls of these rooms must be lined with glazed tiles to a height of about five feet

six inches. This is the case with every building regardless of size or cost. There is also a long list of requirements regarding the arrangement of the rooms, the lighting, ventilation, partitions (the use of wooden partitions is prohibited except in very special cases), specifications for plumbing, prevention of dampness, and the covering of all containers of water in order to avoid insects.

The laws regulating the construction and arrangements of markets, barbershops, bakeries, slaughterhouses, factories for food-products and drinks, restaurants, dairies, fruit stores, etc., all are requirements of a



A Disinfection Station.

similar sort in which concrete, terra cotta, glazed tiles and marble must be employed for floors, walls, tables and receptacles of food.

The regulations for hospitals, theatres, hotels, shops, laundries, stables, sewerage and water-supplies are broad and comprehensive, and give the State Sanitary Service complete authority over all matters sanitary; and as the Service is composed of sufficient personnel and equipment, this supervision and authority is most effective.

The following infectious diseases, when occurring at any place, must be immediately reported to the nearest office of the Service or to the municipal authorities by the physician in charge or by the nearest responsible person: Smallpox; scarlet fever; the pest; cholera; yellow fever; diphtheria; infections of childbirth; ophthalmia neonatorum in maternity hospitals; typhus, typhoid, and paratyphoid; tuberculosis; leprosy; malaria; hook-worm; trachoma; purulent conjunctivitis; dysentery; whooping cough, measles and mumps in schools, asylums and collective dwellings; and any other disease which may be considered necessary by the Director-General.

Neglect of such notification is punishable by a schedule of fines. Isolation, partial or strict, at the home or in the isolation hospitals, according to the disease, must be employed in all of the above cases with the exception of hookworm, dysentery and trachoma. The removal of the patient is always done by carriages or automobiles belonging to the Service and which can be properly disinfected.

In all cases, the nearest disinfecting station sends out a force of men who proceed to make a thorough disinfection of the building and everything necessary for the elimination of all possibility of contagion. This service is performed at the expense of the state.

A medical vigilance service is in operation in all cases, which makes a daily medical inspection of all persons who have come into contact with the patient, and all persons living within certain limits as determined by the Director of the Service. Although vaccination is not compulsory, it is required in public schools and in factories; and in cases where a person has been in contact with an infectious disease and does not care to be vaccinated he is removed to a place where he cannot spread the infection and watched for the proper length of time.

SANITATION OF THE CITY OF SANTOS.

On account of the magnitude of the work and of the special conditions and problems which arose for the sanitation of the City of Santos, the port of the State of Sao Paulo and from which the greater part of the world's coffee is shipped, a special commission was created by the state for the purpose of studying the best methods of draining and sewerage of the city, and to construct and maintain this work, all with state funds. This Commission is entirely separate and distinct from the regular Sanitary Service and is known as the Sanitation Commission of Santos.

The City of Santos is situated on a large island formed by the branching of a large river which empties into the Bay of Santos. The greater part of the city is low, flat and marshy, running from one to six feet above high water level. Previous to the construction of the masonry docks along the waterfront and the sanitary works of the Commission, this wet marshy land, covered with a tangled mass of low vegetation, was the ideal breeding spot for the hordes of mosquitoes which infested the entire city; and the old sewer system was entirely inadequate, so that, during heavy rains the streets were not only flooded with storm water but also with house sewage.

In 1905, under the able administration of F. S. Rodriguez de Brito, an eminent Brazilian sanitary engineer, as head of the Commission, and a large organization, the work was begun by the construction of six large canals, cutting the city from the frontage on the bay to the river on the rear; these canals in turn being fed by an elaborate system of storm sewers and sub-surface drains. The complete sewerage of the city was next undertaken, a most difficult and expensive project on account of the lack

of topography which necessitated the lifting of the sewage at various points, pumping for several miles along the shore, across a large suspension bridge of 600 feet span especially built for this, and another seven miles of piping to its outlet in the ocean. Old and unsanitary house plumbing was condemned and new plumbing installed throughout the city by the Commission and paid for by the house owners.

The present work of this Commission is the maintenance of these works, the repair and construction of additions to the sewerage, the installation of all the house plumbing in the city, and the supervision and inspection of all building construction.



One of the Canals Draining the City of Santos.

When the plans for any building are completed, they must first be sent to the city engineer, who sees that the plans are in accordance with the building laws of the city, in regard to height, design, structural specifications, etc. After this, they are sent to the office of the State Sanitary Service where, if they are in accordance with the sanitary requirements already described, they are signed by the Director of the office, and are then sent to the Sanitation Commission, where a small scale plan of the building is made, showing in detail the plumbing, baths, waterclosets, etc., and a list of all the material required is furnished. No work can be started until all these signatures are on the plans. When the contractor has the building ready for the plumbing and all the material on the list at the site, he notifies the Commission and they send their crew to install the work. After it is all finished the bill is sent to the contractor or owner as the case may be for the actual cost of the work plus a small percentage for its administration.

The total cost of the work which this Commission has done in Santos, including all work up to January 1, 1912, has been \$3,227,000. Of this there is about \$68,000 of house installation, paid for by house owners, and since the above date there has been approximately \$300,000 spent on new work.

At present a similar Commission is undertaking the work of draining and sewerage the city of Pernambuco, one of the northern cities of Brazil, in an intensely tropical climate, where up to the present time yellow fever and other diseases have played havoc with the population. Within a year from now, Pernambuco will be equally as healthful as Rio, Santos and Sao Paulo.

THE MUNICIPAL HEALTH DEPARTMENTS.

The health departments of the various municipalities of the state are strictly under the supervision of the State Sanitary Service, and act as agents of the Service especially where the size of a city does not warrant the maintenance of a branch office.

Their duties include:

The supervision of sewerage, storm sewers, water-supplies, drainage, paving, street cleaning, and the collection and disposal of garbage.

Inspection of houses and new building construction; to enforce the State and Municipal laws.

Inspection of food, milk, etc., and general sanitation.

The organization of an emergency service, hospital, etc.

Acting as agents of the State Sanitary Service by sending all required information, and reports on the vital statistics.

RESULTS AND STATISTICS.

As a result of the immense sums of money spent, of the labor and effort which the Brazilians have expended for the modernizing and cleaning of their communities, and for the abolition of epidemics of infectious diseases not only common to tropical countries but to cities in Europe and in the United States, what have they gained? Have the necessary increase in taxation, the increased cost of building homes and public buildings, and the resulting inconveniences arising from compulsory isolation, quarantine, and in certain cases vaccination, been warranted by the results attained?

I have described the eradication of yellow fever from Rio de Janeiro. The State of Sao Paulo has undergone a similar metamorphosis. Figure 1 shows the mortality by yellow fever in the State of Sao Paulo from 1892 to 1909. During the few years preceding 1900 some of the larger cities of the state had begun works of a character which led to the partial extermination of the fever, without the authorities being aware of the true cause of the dissemination of the disease, as was the case in the cities of Campinas and

Santos; for in 1896, Campinas began to drain off all stagnant water, straighten the courses of streams, and the general removal of all filth and refuse, also reforms in the building laws; and Santos began about the same time the construction of its large dock system.

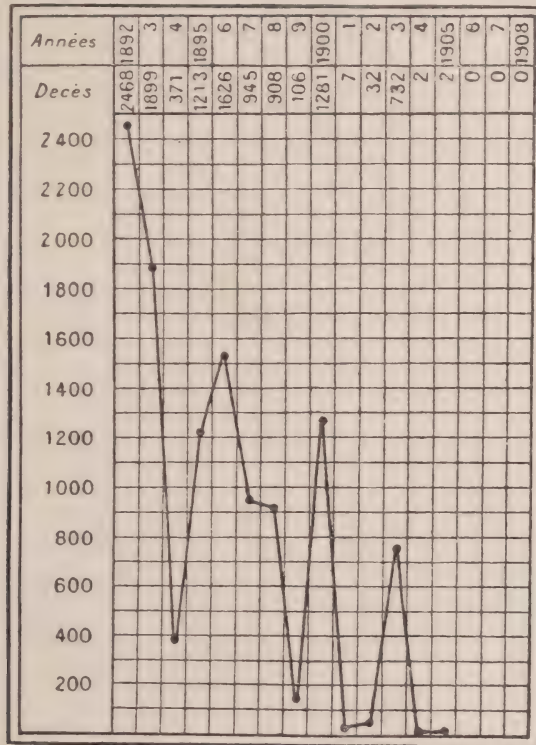


Fig. 1. State of Sao Paulo. Diagram of the mortality by yellow fever in the whole State. (1892-1908.)

But in 1903, Dr. Ribas, convinced of the truth of the deductions at Havana, and after making a series of experiments himself similar to those made in Cuba, as Director-General of the State Sanitary Service, began a campaign against yellow fever and malaria by the eradication of every possible breeding place of the mosquito, and purposely abstained from the disinfection of houses, clothes, etc., connected with yellow fever patients in order to give further proof to his contentions. In Soracaba, a town of fifteen thousand inhabitants, 2,322 cases of yellow fever were reported the year in which the work of sanitation was begun. The following year there was not one case, nor has there been one since.

Since 1903, yellow fever in both Santos and Campinas has been practically exterminated. Other cities in the state also show the same remarkable absence of the disease during the years following 1903.

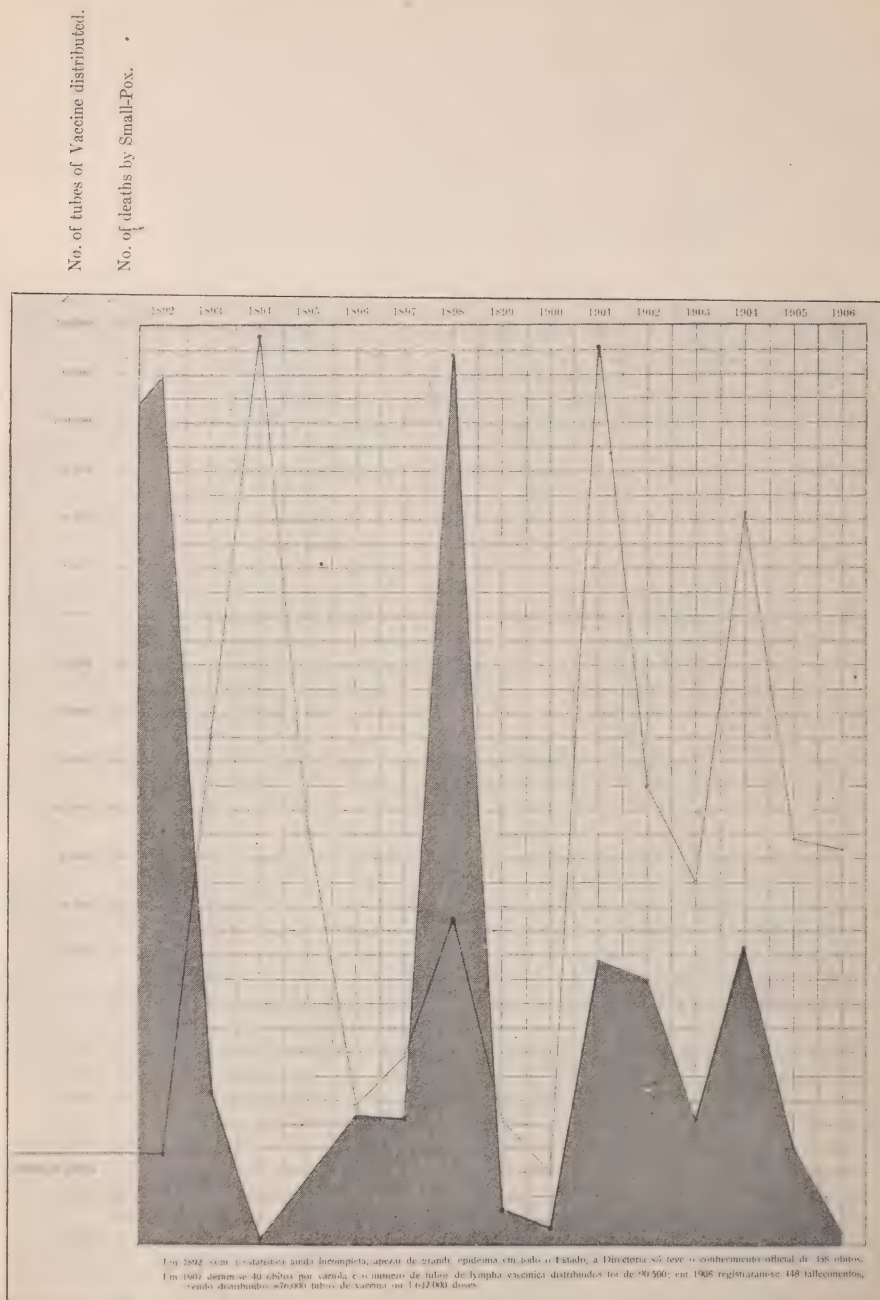


Fig. 2. The Relation between the Distribution of Vaccine and the Mortality by Smallpox in the State of São Paulo. The shaded portion represents the deaths and the single line represents the number of vaccine distributed.

In 1892 the first Department of Smallpox Vaccine was created on account of the prevalence of the disease at that time, and Figure 2 will show better than words the relation between the distribution (which is free) of the vaccine and the extent of the disease throughout the state. At present smallpox is of very rare occurrence and when a case does occur, the steps taken to prevent its spread are so prompt and effective that an epidemic is practically impossible.

Typhoid fever and other similar intestinal diseases have all undergone a similar reduction in their extent, and show similar falls in their mortality charts during the years in which active sanitary measures were begun



An Isolation Hospital in the State of Sao Paulo.

against them by the organization of an efficient health organization. A great deal of attention was paid in this respect to the extermination of breeding places of the fly and other insects, the food and milk supply, the general sanitary conditions of dwellings and their plumbing, and by the selection and construction of waterworks supplying water as pure as modern science will permit.

The City of Santos is now, purely on account of the sanitary changes which have been effected, a beautiful, healthful city, the health resort of the state. Every year from June to September, the numerous hotels are filled with people from the interior of the state for the purpose of bathing and recreation. A few years ago it was shunned by everyone, and was the exponent of sickness and death.

The cities of the State of Sao Paulo, and others in which proper sanitary organizations have been formed, such as the states of Minas Geraes, Parana and Rio Grande de Sul, have become clean, healthful, livable, modern and

prosperous in proportion to the extent into which they have entered upon the work of sanitation.

The natural result of such organizations above described has been an unqualified success in the suppression of some, and in the elimination of other diseases. In whatever parts of Brazil such work has been initiated, there has always been the resulting cleanliness and salubrity. The State of Sao Paulo leads the remainder of Brazil in its efficient sanitary system, with the exception of the Federal District. The states south and adjacent to it maintain health departments which approach that of Sao Paulo very closely, while most of the states to the northward are only now engaging upon the work of sanitation, as the states of Bahia and Pernambuco are doing now. The interior states, on account of the small proportion of settled territory, have no populous centers, and the work of sanitation is that of rural communities and which diminishes rapidly as it approaches the wilderness, which is inhabited only by Indians.

The cities of the extreme north near the equator labor under the disadvantage of what may be termed the most intensely tropical and dangerous climate in the world; but in the case of Sao Paulo, although it may be said that it has been necessary to employ such drastic measures as these on account of the climate, the work of sanitation has been performed in a climate almost identical with that of our State of Texas, with the exception perhaps of Santos (and Rio de Janeiro), as the greater portion of the state is some 2,000 feet above sea-level. It is dry and during the winter season cool; a climate favorable for the production of coffee, alfalfa, cotton, cattle, and similar products.

We must acknowledge and respect the intelligence, progressiveness, and ability in science and administration of the Brazilian doctors, engineers and executives who have, unaided, except by precedent, produced the results which they have attained in their country, and the Brazilian people who have by their coöperation made the work of sanitation possible. The men who are in charge of this work are very hardworking and serious-minded scientists, who have traveled extensively for the purpose of studying conditions in other countries. For their work, Europe has not been slow in honoring these men, and it was only this year that the Chair of Bacteriology was offered to Dr. Oswaldo Cruz by the University of Berlin.

It may be true, that in the application of their laws there have been mistakes made, in certain cases there is some misdirected energy, money has been spent in certain ways which might have been placed to better advantage in other directions, the supervision of some parts of the work by experienced experts might have resulted more economically but not more effectively; their methods in some respects may differ from ours; but the results attained, the spirit in which this work has been undertaken must compel our admiration and serve as an example to a large number of our own communities.

AN IMPROVED (DURHAM) FERMENTATION TUBE.

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The fermentation tube plays a part not unimportant in the determination of bacterial forms, in particular those organisms comprising the colon-dysentery-typhoid group. Since the bacteriological sanitary analysis of water and raw foods rests primarily upon the determination of gas-forming intestinal bacteria, it is here that the use of the fermentation tube has found its greatest application, not only in the determination of types but in the presumptive tests for *B. coli* as well.

It is interesting to note that Smith¹ found the fermentation tube an apparatus of considerable antiquity and of uncertain origin; in Detmer's *Pflanzenphysiologischen Practicum* it was figured as Kühn's Gefährungsgefäß. It had been more recently utilized by Einhorn² for the quantitative determination of sugar in urine and by Doremus³ for the estimation of urea, but its first application in bacteriology was by Smith⁴ in 1889 for the purpose of securing anaerobiosis and in several publications^{5 6} he emphasized its fundamental usefulness for the detection of gas formed by bacteria in media containing carbohydrates.

A modification was suggested by Hill⁷ consisting of a thimble-shaped stopper in the closed branch to facilitate cleaning, filling, and examination of the inclosed gas without disturbing the culture fluid.

It was a distinct advance from the viewpoint of cheapness of first cost, ease of manipulation and freedom from breakage, when Durham⁸ proposed, and later⁹ applied successfully in studying the colon-dysentery-typhoid group, the combination of test tube and inverted vial which until recently has been presumed to be equal in effect to the original fermentation tube of Smith.

Smith, Brown, and Walker¹⁰ revived the interest of bacteriologists in the study of anaerobic bacteria by pointing out the value of milk as a culture medium in the fermentation tube utilized for this purpose, and our best knowledge concerning the intestinal flora, aerobic and anaerobic, rests upon the researches of Herter and Ward¹¹, Herter and Kendall¹², and Kendall¹³ using the Smith type of fermentation tube. It remains yet to be seen if the Durham fermentation tube can be substituted entirely for the Smith tube in this type of work.

The strongest objection to the Durham tube would seem to be the difficulty of qualitative and quantitative determination of the gas. But such determinations in the Smith tube are futile, as Durham⁹ points out, due to the varying absorption of CO₂ by the culture fluid. Keyes¹⁴ more recently

reiterated the inutility of the ordinary fermentation tube for quantitative work and pointed out three factors which contribute to its unsuitability, namely (a) decreasing contribution of gas from a given volume of culture fluid to the closed branch, (b) solution of the gases due to their partial pressures, and (c) loss by diffusion through the liquid to the exterior. Keyes developed a method of obtaining the gas from *B. coli* under conditions suitable for analysis, at the same time excluding the factor of partial pressure of the atmosphere.

My interest in the question of efficacy of the Durham fermentation tube was aroused by a note upon this subject by Browne¹⁵. In making bacteriological tests upon the shell water of oysters suspected of harboring intestinal bacteria he was lead to a comparison between the Smith fermentation tube and the inverted vial tube of Durham with the following results:

TABLE I.
PERCENTAGE OF EFFICIENCY.

Amount of fluid inoculated.	(Smith) Fermentation tube.		(Durham) Inverted vial.	
	24 hours.	48 hours.	24 hours.	48 hours.
1 cc.	84.6%	94.3%	92.3%	96.1%
0.1 cc.	86.5%	90.3%	59.5%	84.6%
0.01 cc.	32.6%	23.0%	23.0%	42.3%

From this table, constructed upon the basis of tests in lactose peptone bile, the following conclusions were drawn, namely, that, "inverted vials seem to be more efficacious in the low dilutions than the fermentation tube," while, "fermentation tubes seem to be more efficacious in the higher dilutions than the inverted vial," showing that, "it is not safe to depend upon single tubes to demonstrate fermentation," but that, "duplicates should always be used and if possible triplicates."

Although Browne did not offer any explanation of the data displayed it may be easily inferred that the reason for the irregular results with the Durham tube in the higher dilutions rests upon the fact of insufficient communication between the inside and outside of the vial, due to the square end of the latter which fits rather snugly against the bottom of the test tube. In the case of non-motile organisms especially a longer time would be required to reach the inside of such a vial than with the Smith fermentation tube. It is the purpose of this paper to show the possibility of overcoming this objection to the usual type of Durham fermentation tube.

EXPERIMENT I.

The following test was made using in one half the series of tubes an inverted vial having the open end ground to an angle of 45° thus allowing freer communication between the fluid outside the vial and that inside, while in the other half of the series a similar sized vial with the end cut squarely across was used. These vials were 4.4 cm. long and 0.8 cm. in diameter, being placed in test tubes 12.2 cm. long and 1.6 cm. in diameter.* The combined tubes were filled half full with azolitmin dextrose (1 per cent.) bouillon and sterilized on three successive days in the Arnold sterilizer.

It was noted that while decolorization took place during sterilization throughout the liquid that the color returned on cooling the bouillon inside the vial only in the case of the diagonally-cut vial; the fluid outside the squarely-cut vial resumed its color also but that inside remained of a straw-yellow hue. This is a familiar phenomenon and is due to the reduction of the oxygen from the azolitmin, the color reappearing on absorption from the air. This observation indicates that anaerobic conditions inside the diagonally-cut vial are less perfect than in the squarely-cut vial.

Ten sterilized tubes of each combination for each dilution were inoculated each with 1 cc. of a suspension of a 24-hour broth culture of *B. coli communior* in distilled water in the dilutions noted in Table II and then incubated at 37° C. for 24 hours. A Litmus lactose agar plate was also made for each dilution to determine the number of organisms inoculated. The results show no difference, there being an equal amount of gas in each of the eighty tubes employed.

TABLE II.

NUMBER OF TUBES AND PERCENTAGE OF GAS FORMED BY *B. COLI COMMUNIOR* IN DIAGONAL AND SQUARE DURHAM VIALS.

Dilution.	Square vial.	Diagonal vial.	Litmus lactose plate.
	Inc. 37° C. 24 hours.	24 hours.	
1-10	100% 10 tubes	100% 10 tubes	Uncountable
1-100	100% 10 tubes	100% 10 tubes	Uncountable
1-1,000	100% 10 tubes	100% 10 tubes	About 10,000 colonies
1-10,000	100% 10 tubes	100% 10 tubes	About 1,000 colonies

*A ready cut vial of even better dimensions, i. e., 5.1 cm. in length and 0.5 cm. in diameter is obtainable from Whitall Tatum Company, Philadelphia, Pa.

EXPERIMENT II.

It was planned in this case to utilize a less vigorously fermenting organism, namely a member of the *Mucosus capsulatus* group recently isolated from a case of chronic sinusitis. Dilutions of a 24-hour dextrose broth culture were made in sterile 0.85 per cent. NaCl such that 1 cc. contained respectively 1-10,000, 1-1,000,000, and 1-100,000,000 of the original culture. Ten tubes of each combination as well as an agar plate for each dilution were inoculated by the addition of 1 cc. from a pipette. The result of this test shows a larger amount of gas in more tubes in the case of the diagonal vial and this difference is most marked in the higher dilutions and upon the first reading. In the case of heavier inoculation and longer incubation the differences tend to decrease.

TABLE III.

NUMBER OF TUBES AND PERCENTAGE OF GAS FORMED BY *B. MUCOSUS CAPSULATUS* IN DIAGONAL AND SQUARE DURHAM VIALS.

Dilution.	Square vial.		Diagonal vial.		Agar plate.
	Inc. 37° C. 24 hours	48.	24.	48.	24.
1-10,000	10% 5 tubes	50% 4 tubes	25% 10 tubes	30% 1 tube	Uncountable
	25% 4 tubes	60% 2 tubes		50% 6 tubes	
	50% 1 tube	80% 2 tubes		80% 3 tubes	
		100% 2 tubes			
1-1,000,000	5% 5 tubes	50% 4 tubes	25% 7 tubes	50% 4 tubes	Uncountable
	10% 3 tubes	60% 3 tubes		60% 3 tubes	
	20% 2 tubes	80% 2 tubes		80% 2 tubes	
		100% 1 tube		100% 1 tube	
1-100,000,000	Trace 5 tubes	40% 2 tubes	5% 4 tubes	50% 1 tube	58 Colonies
	1% 3 tubes	50% 5 tubes		60% 2 tubes	
		60% 3 tubes		80% 4 tubes	
	5% 2 tubes	90% 1 tube		100% 3 tubes	

Simultaneous examination of the *B. coli communior* of Experiment I and the *B. mucosus capsulatus* showed the former to be highly motile whereas the latter is non-motile. To this property is due I believe the better differentiation shown by the latter organism.

EXPERIMENT III.

In view of these observations it was now necessary to compare the diagonal vial with the Smith fermentation tube. A 24-hour culture of *B. mucosus*

sus capsulatus was diluted with sterile 0.85 per cent. NaCl so that 1 cc. contained 1-100,000,000 of the culture and from this 10 diagonal vial tubes and 10 Smith fermentation tubes were planted by the addition of 1 cc. of diluted culture. An agar plate was similarly seeded. The result shows the advantage to again lie with the diagonal vial. This was not anticipated but is probably due to the slightly constricted throat of the Smith tube. It may be noted here that Smith (1) lays especial emphasis upon the necessity of this constriction from the standpoint of perfect anærobiosis.

TABLE IV.

NUMBER OF TUBES AND PERCENTAGE OF GAS FORMED BY *B. MUCOSUS CAPSULATUS* IN DIAGONAL DURHAM VIALS AND SMITH FERMEN-
TATION TUBES.

Dilution.	Smith tube.		Diagonal vial.		Agar plate.	
	Inc. 37° 40 hours.	65.	40.	65.	40.	65.
1-1,000,000,000	10% 4 tubes	10% 4 tubes	20% 1 tube	30% 1 tube	196 colonies	
	25% 5 tubes	25% 5 tubes	30% 1 tube	50% 5 tubes		
	40% 1 tube	40% 1 tube	50% 8 tubes	60% 2 tubes 70% 2 tubes		

At 40 hours the absolute amount of gas was approximately the same in both types of tubes. The Smith tube used is longer, the closed arm having approximately $2\frac{1}{2}$ times the capacity of the Durham vial.

I desire to thank Miss Emma Staples and Miss Vera Bennett for their coöperation in this study.

CONCLUSIONS.

A diagonally-cut vial is preferable in the combination of test tube and vial known as the Durham fermentation tube because, particularly in the case of non-motile bacteria, the amount of gas collected is greater, it appears earlier, and in a larger number of tubes than in either the square vial or the Smith fermentation tube. These factors are of importance especially in presumptive tests where oftentimes small numbers of gas-forming bacteria are implanted and where early readings are to be desired. They are of less importance in identification of pure cultures where larger numbers of organisms are implanted.

REFERENCES.

- ¹ Smith, Wilder Quarter Century Book, 1893, p. 187, Comstock Publishing Co., Ithaca, New York.
- ² Einhorn, Virchow's Archiv. 1885, CII, S. 263.
- ³ Doremus, quoted by Smith, Wilder Quarter Century Book.
- ⁴ Smith, Centr. f. Bakt. 1890, VII, S. 502.
- ⁵ Smith, Centr. f. Bakt. 1895, XVIII, S. 1.
- ⁶ Smith, *Jour. of the Boston Society of Med. Sciences*, 1899, III, p. 340.
- ⁷ Hill, *Jour. of the Boston Society of Med. Sciences*, 1899, III, p. 137.
- ⁸ Durham, *British Med. Jour.*, 1898, I, p. 1387.
- ⁹ Durham, *Jour. Exp. Med.*, 1900-01, V., p. 353.
- ¹⁰ Smith, Brown and Walker, *Jour. Med. Research*, 1905, XIV, p. 193.
- ¹¹ Herter and Ward, *Jour. Biol. Chem.*, 1906, I, p. 415.
- ¹² Herter and Kendall, *Jour. Biol. Chem.*, 1908, V, p. 283.
- ¹³ Kendall, *Jour. Biol. Chem.*, 1909, VI, p. 257.
- ¹⁴ Keyes, *Jour. of Med. Research*, 1909, N. S. XVI, p. 69.
- ¹⁵ Browne, AM. JOUR. OF PUBLIC HEALTH, 1913, III, p. 701; Also *Science*, 1913, XXXVIII, p. 371.

A COMPARISON BETWEEN THE TWENTY-DEGREE AND THE THIRTY-SEVEN DEGREE PLATE COUNTS FOR ENUMERATING BACTERIA IN WATER.

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The widespread objection to the change from the standard temperature of 20°C., for incubating plates for bacterial counts, to 37°C. has led us to run our routine counts at both temperatures for a time and contribute the results, along with those of other workers, who no doubt have been making similar comparisons, to a much-needed consideration of the matter.

To immediately discard the 20° count in favor of the higher temperature for all classes of work, without extended comparisons between the results obtained at both temperatures, or between bacterial counts at the 37° temperature and some other index of the quality of the waters examined, such as the routine isolation of the members of the *B. coli* group, would be much like returning to the time when the plate count was first brought into use.

Without going into a detailed consideration of the comparative conveniences of the two methods for all classes of work, as this has been so ably discussed before this section and recently in several published articles, notable among which is the paper by Professor Whipple, it may be well to briefly mention some points of our experience so far as the work of the comparisons has progressed.

We at first used the standard medium containing one per cent. of agar, but found that even the drying of the agar before making up a lot of medium did not entirely prevent the spreading of some colonies in the plates grown at 20°, although earthenware tops were used. The use of earthenware tops for the 37° plates was impossible, as the agar became almost entirely dried before counting could be done. The use of one and one-half per cent. agar and earthenware tops for the lower temperature plates gave excellent results. The same agar was used for the 37° plates, which were covered with glass tops and inverted.

For the purpose of this paper the results of daily examinations of samples of water from three moderately polluted streams, flowing through essentially the same kind of rural districts, and discharging from ten million to one hundred million gallons per day, were selected.

The average of the 37° temperature counts is 322; and the average of the 20° counts is 2,867, which is about ten times the 37° average. Several

methods of grouping the results were considered, but the following scheme of comparing the counts with the probable character of the water, and yet keeping the table as condensed as possible, was decided upon: Each sample having been subjected to examinations in pure culture for members of the *B. coli* group, the counts at both temperatures were grouped according to whether the sample had shown the presence of one or more members of the *B. coli* group in .01, 0.1, 1, or 10 cc., and further separated into the number of times they came within certain limits. The tests for members of the *B. coli* group included the use of dulcitol, in addition to the three usual sugars, appearance of growth on gelatin, and other special tests after rejuvenation when the original results were not sufficiently characteristic.

TABLE SHOWING A COMPARISON BETWEEN THE 20° AND THE 37° PLATE COUNTS IN RELATION TO ISOLATIONS OF *B. COLI* ORGANISMS.

	B. coli group in .01 cc.		B. coli group in 0.1 cc.		B. coli group in 1.0 cc.		B. coli group in 10 cc.	
	37°	20°	37°	20°	37°	20°	37°	20°
Number of tests.....	9	9	50	50	70	70	60	60
Averages.....	2,700	20,000	390	5,500	170	2,700	85	1,300
Number of counts between								
1 and 50.....			5		8		24	
50 and 100.....			9		18	1	24	2
100 and 200.....			9	2	24	2	4	7
200 and 300.....	1		10	3	10	7	4	10
300 and 500.....	1		5	3	6	9	4	8
500 and 1,000.....	2		6	10	4	20		11
1,000 and 2,000.....	1		4	14		10		11
2,000 and 3,000.....			2	3		4		3
3,000 and 5,000.....	1	2		4		5		4
5,000 and 10,000.....	2	1		6		8		4
10,000 and 20,000.....		2		2		3		
20,000 and 50,000.....		3		3		1		
50,000 and 100,000.....		1						

Baltimore City Water Department.

A striking fact brought out by this method of grouping is that the averages at both temperatures increase in geometric progression as the *B. coli* group organisms were isolated from 10, 1 and 0.1 cc. This does not hold good, however, with the counts grouped under, "*B. coli* present in .01 cc.," where the small number of counts probably materially influences the average. A larger number of counts quite naturally fall below the

average than above it, as a very few high counts materially increase the average; but if there be any advantage of one count over the other as an index of pollution, it is perhaps slightly in favor of the higher temperature, the counts at which show less variation within the limits of the counts.

The use of the two temperatures for examining waters disinfected with calcium hypochlorite has shown that the organisms growing at 37° are more resistive to the treatment than those growing at the lower temperature, and that the higher temperature seldom shows the presence of aftergrowths, these aftergrowths usually consisting of those organisms, thriving best at a lower temperature, that have escaped the treatment.

A decision of which temperature should be adopted, or whether the lower temperature should be used for certain kinds of work and the higher temperature for certain other kinds of work, may well be postponed until sufficient comparisons have been made.

The Health Department Nurse.

Where the cooling breezes never seem to come,
Where the summer heat is throbbing out
its curse,
Where the stench of human hiving marks
the slum,
There is where you'll find the Health De-
partment Nurse.

Where the garbage-littered alleys ooze and
smell,
Where the old-faced children swarm the
narrow street,
Where is found the human dump, a living hell,
Where they're slaving on but half enough
to eat.

Where the summer death-rate claims its
highest toll,
Where every sixth or seventh baby dies,
Where the slattern mothers count the mourn-
ful roll
That is yearly called to fever, filth and
flies.

Here—where public greed and ignorance
play a part
To the pulling of the politician's strings,
Does the Health Nurse find her work and
break her heart
With the aching of the gladness that she
brings.

Here, in spotless white, amid disease and
grime,
Is she carrying the gospel of the clean,
And a ray of dawning health will mark the
time,
For they're hungry for the chance that
they have seen.

To the mother in the grip of labor pain,
To the baby with the heritage of sin,
To the cankered heirs of this our public
stain,
Does the Health Nurse bear the slogan
that shall win.

To the suffering and needy and distressed
Is she giving without stint her love and
care;
And, wherever she is known, her name is
blessed,
And wherever she is needed, she is there.

So we'll doff our caps and help her when we
can,
As she goes about among the sick—and
worse,
For she's doing what can not be done by man,
She's a woman—and the Health Depart-
ment Nurse.

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PROF. GEORGE C. WHIPPLE, Cambridge, Mass.

DR. WILLIAM C. WOODWARD, Washington, D. C.

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SIGNIFICANCE OF JACKSONVILLE MEETING.

It was practically the unanimous sentiment of those who attended the meeting of the American Public Health Association in Jacksonville the first week of December that it awakened in the Association a new consciousness. With this new consciousness came also a realization of the Association's opportunities, of its position in the public health field, of the importance, nay, even the duty, of making the most of that position. In his presidential address Dr. William C. Woodward pointed out that position. After urging the necessity of consolidating public health organizations of a national scope or at least—as a first step—coördinating their activities and pointing out that there are lack of efficiency and over-lapping of coördination, Dr. Woodward said:

“If a maximum of efficiency can be obtained only through the consolidation of our public health agencies into a single association or society, we must bend our efforts toward that end. Self-interest must be laid aside and each must loyally lend his best endeavor. That the end will be accomplished without disappointment and heart burnings no one can hope, but no matter what others may do the American Public Health Association must choose the path that leads to the maximum of effectiveness and adhere to it.”

Thus was sounded the key-note of the convention. Sounding key-notes has been the time-honored function of conventions. Key-notes are all

very well in their way but most of them are merely sound, and, furthermore, sound that does not carry far from the platform on which it originates. The Jacksonville convention, however, did more than sound a key-note. It began to sing a new song.

The way to Tipperary is probably no longer than the path which President Woodward pointed out but there were many evidences in the Jacksonville meeting to indicate that the Association is at least about to get on that path, if, indeed, it is not already there.

Chief among these evidences is the resolution which the convention adopted unanimously, providing for a committee to arrange for a public health congress in 1916. Efforts will be made by this committee to bring about, at the same place and during the same week or two weeks in 1916, the annual meetings of the most important national public health organizations.

Evidence that the Association realizes the necessity for militant field work as well as coördination was the resolution providing for a committee to investigate the drug evil in its legislative and publicity aspects. A large part of the efforts of this committee, as indicated by the resolution, will be an active campaign with the newspapers of the country to present to them, confidentially if necessary, the real, sinister significance of the patent medicine advertisements.

Even the selection of the new place of meeting, in New York State, was an indication of the new idea. One of the chief reasons for the selection of Rochester was that it was possible to hold the convention in conjunction with the New York State Sanitary Officers' conference. That conference will bring together nearly a thousand of the Empire State's health officers. It goes without saying that many of those who are not now members will at that meeting become members, but more important than this is the opportunity for displaying to the health forces of the nation the workings of New York State's new health law and department. The 1915 convention will be a clinic in public health legislation and administration. By the time the convention is held, New York State will have been working under its new law for a little more than two years. It will have been tried not only by the experience of the field workers but also will have passed through trials of two legislative sessions. The American Public Health Association will be fortunate indeed in seeing at first hand the results of this experience.

The 1915 convention will therefore furnish not only an object lesson in coöperation but will provide material for an active propaganda in modern public health legislation. Machinery for such propaganda, in coöperation with the Federal Health Service and State and local health forces, is one of the greatest needs in the national public health field today. Active, general public health field work, similar to the effective field work of the National Tuberculosis Association, is prominent among the milestones of progress on that new path that President Woodward pointed out.

Southern newspaper comment indicates that the Jacksonville meeting stimulated in the South a new interest in public health. Certainly the exhibit gathered together from the leading Southern cities and nearly all of the Southern states, brought to the Association a new appreciation of the South's health problems and their many complications. The most important result, however, of the memorable 1914 convention was the new consciousness of power and opportunity which it stirred in the Association.

SUPERVISION OF COMMUNICABLE DISEASES IN THE SMALLER MUNICIPALITIES.

H. W. HILL, M. B., M. D. D. P. H.,
Executive Secretary; Minnesota Public Health Association.

Read at the Mankato Meeting of the League of Minnesota Municipalities, October 21, 1914.

The Public Health work of today is very different in character from that of twenty or even ten years ago in both big places and in small.

Then our conception of a public health department, especially in the smaller places, was a medical man who would casually put up and casually take down placards when infectious diseases were more or less accidentally reported to him; and one or more worn-out old men who helped the health officer in this onerous task, burned a little sulphur or boiled a little formaldehyde in the room where the patient was supposed to have been confined, occasionally rebuked some householder for an untidy back yard, a garbage heap, or cess-pool, and in general wandered about the community in a more or less desultory way urging people of the less wealthy residential districts to clean up. Most citizens looked upon the health department as a harmless, necessary evil, to be "Siced on" to neighbors at times when the neighbors made any unusual contribution to the general odors of the vicinity and to be resented by themselves with conscious dignity and hurt pride whenever the inspector turned his thoughts their way. "My well is the best well in the township; but my neighbor's well—I don't see how those people drink it—my back yard is all right—but it's a wonder my neighbor's back yard does not breed a pestilence—"

Everyone shuffled along very comfortably, was born, had all the regulation three and one-half children infectious diseases per head before he was twenty-one, passed on to maturity, contracted such adult diseases as were open to him to contract, grew old, and died with a pleasant if hazy impression that his community was the healthiest in the state, that he was entitled to pity people who had to live under a less well regulated public health régime, and that, all things considered the health department did very well in view of the fact that they really had not much to do anyway in such a healthy community.

That the operations of such health departments accomplished nothing in the prevention of disease and death, that they made many unnecessary ordinances, imposed many wholly needless burdens and caused many a wholly useless clean-up, that they were helpless in the presence of an epidemic and absolutely futile to stem even the usual current of disease never seems to have entered anybody's head.

But we have reached an age where we do not take for granted that a thing is good simply because it is long established. We require every

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body and every thing to show some reason for existence, some result obtained for time and money expended. We want to know—and we want to be shown.

This investigative turn of the public mind into established procedures revealed some curious things concerning the old style health department; such as that despite the alleged health department activities, disease was just as prevalent in communities with such health departments as in those without; that in brief, whatever functions a health department exercised they were not functions which had any marked effect in disease and death.

[The present conception of a modern health department is a body of highly trained people who really know all about the diseases they exist to prevent; who really know how to prevent them; and who really have the necessary facilities to really accomplish prevention.]

We no longer believe in a promiscuous way the old-wives fables that specific diseases of definite and now well-known origin can develop from bad smells or decomposing vegetable or animal matter. We do not attribute every disease to sewer gas or swampy land. We recognize that of all the diseases man is heir to, the ones which we can prevent are all contracted by more or less direct contact with previous cases; and the modern health department is intent on knowing and supervising every case until it can no longer spread the disease.

Also we have at last recognized the apparently only too obvious fact, nevertheless long overlooked, that it is not the severe case of diphtheria or scarlet fever, tuberculosis or smallpox that chiefly spreads infection, for the severe case is sick in bed as a rule and comes in contact almost solely with the doctor and the nurse. It is, we see now clearly, the mild, the unrecognized and too often the deliberately concealed case, the case not sick enough to go to bed, not sick enough even to call a doctor, that runs about the community at large and disseminates infection to all corners.

The modern health department which contents itself with placarding severe cases during the height of the disease is a futile and practically useless municipal department, unjust in that it penalizes the honest citizen who allows his doctor to report the case, while his neighbors' children with the same disease escape; futile, because for the one case thus isolated, a dozen are often running free and uncontrolled.

[The supervision of infectious diseases is today a scientific, strenuous occupation in which the conscientious and well-posted health officer finds use for all his medical training, a large share of detective ability, infinite patience and tact, and above all a firm jaw and a stiff backbone.]

One such man to every 20,000 of the population would have a marvelous effect in a very short time in Minnesota for he would really do what most local health departments now only go through the form of doing—he would trace infection mild, unrecognized and concealed through its many ramifi-

cations and he would really prevent further spread instead of accomplishing almost nothing.

The small municipality cannot afford such a man; even the large ones in Minnesota still have only part-time health officers with departments underpaid, under-manned, unprovided with proper facilities.

Every municipality of twenty thousand inhabitants or more should have one whole-time health officer devoting himself not to municipal housekeeping, cleaning streets or collecting garbage, but to the prevention of disease and death. Of course, garbage collection, street cleaning, etc., are important municipal enterprises, but they are matters calling for administrative business ability, not the technical training of a medical man in the origin and methods of spread of contagion. Through what form of imbecility were our forefathers led to believe that the ability to distinguish typhoid fever from typhus fever, training in the use of the microscope or knowledge of the period during which scarlet fever is infectious were prerequisites to organizing a gang of scavengers to make reasonably good time from the householders' garbage can to the city dump? Nuisances also must be regulated and abated; but these are pure police duties. An intimate knowledge of human anatomy, physiology, and pathology is not a prerequisite to finding out whether or not the smell from a rendering plant causes complaint amongst the neighbors. Poorest of economies is it to use teaspoons for driving nails. Why train a man at great expense over long years to do one thing well and then set him to do badly something he has never learned? The whole-time health officer should therefore have no such occupations to distract him. Communities of less than 20,000 may be united to provide among themselves a similar official.]

This conception of health department work is growing everywhere, but the tendency is to hand this work over to the state, because of the difficulties the smaller communities would have in getting together satisfactorily on a choice. In New York, Maryland, Wisconsin, in this country, in Ontario and Quebec across the line, the state government has a number of such experts each with his own district to look out for; not replacing the local health officer, but helping him, doing the things he now leaves undone, following up mild, unrecognized and concealed cases as he cannot or will not do.]

This we hope to see in Minnesota. We are asking for twenty such men in our eighty-four counties outside Ramsey and Hennepin. The Federal government expert who recently investigated Minnesota Health work has strongly recommended this plan in his official report and we hope to find you gentlemen convinced and strong supporters of it.

Please remember that the whole meat of health department is in *doing* it; and no amount of regulation, advice or wisdom recorded in your ordinance amounts to preventing a single case, even of chickenpox, unless it is *done*, not merely talked about or written.]

THE QUEQUECHAN RIVER IMPROVEMENT, FALL RIVER.

A MILLION DOLLAR PROJECT IN MUNICIPAL HOUSEKEEPING.

FREDERIC H. FAY,* C. E.

Read before the Massachusetts Association of Boards of Health, October 29, 1914.

In the Quequechan River situation Fall River is confronted with a problem which vitally affects the health and the industrial welfare of the city. Before undertaking to describe conditions in detail a brief general view of the city and its surroundings as well as a dip into history are desirable in order that the situation may be more clearly understood.

FALL RIVER'S ADVANTAGEOUS LOCATION.

From the standpoint of natural advantages, Fall River's location is particularly favorable for the development of a large industrial center. The city lies at the mouth of the Taunton River bordering on Mount Hope Bay, a tributary of Narragansett Bay, and its excellent harbor is accessible to ocean-going vessels of deep draught, making it possible to bring cargoes of coal and raw materials by water directly to the city's water front.

To the east of the city and close at hand lie the Watuppa Ponds, large and beautiful lakes, which furnish the water necessary for domestic and manufacturing purposes. Few cities are favored with such natural advantages as these.

WATUPPA PONDS AND TRIBUTARIES.

The Watuppa Ponds, originally one large lake but of late years separated into two by the building of a causeway at the Narrows, are together the largest body of fresh water in Massachusetts. The total length of the two ponds is about eight miles; the maximum width, at the South Pond, is approximately one and one-half miles; and their combined area is five and one-quarter square miles. Tributary to the South Pond are three smaller ponds, Stafford, Sawdy and Devol, having a combined area of one and one-half square miles. The total area of the watershed draining into the Watuppa Ponds is twenty-seven and one-half square miles, of which six and three-quarters square miles, or about twenty per cent., is pond area, an unusually large proportion of water surface to drainage area.

The total storage capacity at full pond level of the two Watuppa Ponds is over fifteen billion gallons, and that of the three tributary ponds to the South is nearly four billion gallons. Of course, by no means all of this storage is available, but by the improvements now contemplated nearly forty per cent., or over seven billion gallons, can be utilized.

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Attention should be called to the fact that the Watuppa Ponds watershed lies not only in three Massachusetts towns, Fall River, Dartmouth and Westport, but also partly in the state of Rhode Island, Stafford Pond and its drainage area being wholly within the town of Tiverton. The fact that two states are involved adds difficulty to the problems of the conservation and sanitation of these waters. The elevation of the two Watuppa Ponds is about one hundred and thirty feet above sea level.

QUEQUECHAN RIVER—EARLY HISTORY.

The outlet of the Watuppa Ponds is the Quequechan River, which leaves the South Watuppa Pond at the sand bar and flows on almost a level course through the heart of the city for nearly two miles to a point near the City Hall. It then falls rapidly the last half mile of its course, having a drop of nearly one hundred and thirty feet, emptying into the tide waters of Mount Hope Bay.

The name Quequechan in Indian language means "falling water"; and from it the name of the city has been derived. From the time the whites first settled Fall River the value of the mill privileges at the successive falls along the lower half mile of the river was recognized, and mills were early located here.

Originally the Quequechan was a narrow stream for its whole length, the width between the banks averaging perhaps a hundred feet.

In 1826, the use of the water for power purposes had become so extensive that the mills on the stream saw the need of securing more power by additional storage in the Watuppa Ponds, and the Watuppa Reservoir Company, an association of the several mills, was organized and incorporated by an act of the legislature, its purpose being to control the waters of the stream, and to build a dam above the upper fall which should raise the level of the water in the Watuppa Ponds, and the upper portion of the Quequechan about five feet. This work was carried out, and the raising of the water level resulted in the overflow of the banks of the stream for a considerable distance, the Reservoir Company shrewdly securing flowage rights, if only by the payment of nominal sums, on all of the overflowed lands on the banks of the stream and the shores of the ponds. By the construction of this Watuppa Dam about two hundred acres of the banks of the upper Quequechan were overflowed and transformed into shallow flats. From 1826 to the present time the control of the waters of the Watuppa Ponds and the Quequechan has remained in private hands, those of the few mills on the lower portion of the river which together constitute the Watuppa Reservoir Company.

With the introduction of steam power, the conditions at Fall River were radically changed. Where formerly mills were dependent upon the power derived from water-wheels, and could therefore be located only at the falls on the lower portion of the stream, new mills were now built along the

shores of the upper portion of the river, from which they could obtain an abundant supply of water for boiler feed and other mill purposes. In some cases these mills wished to encroach upon the overflowed flats, in order to secure advantageous mill sites, while the Reservoir Company desired to use all of the flats for the storage of water. The result was that the Reservoir Company established definite channel lines, to which the owners of the shore property would be allowed to fill upon payment to the Reservoir Company of a stiff price for the area filled, as damage to that company for the loss of its flowage rights. Under this arrangement a small proportion of the area of flats has been filled.

CITY WATER SUPPLY.

By 1870 the city felt the need of a system of water supply and naturally turned to the Watuppa Ponds. It secured the passage of an act by the legislature, in 1871, which authorized the city to take water for domestic purposes from the North Pond; but the prior right to the use of the waters of these ponds by the Watuppa Reservoir Company under its charter of 1826 being recognized, the act of 1871 stipulated that not only should the city be liable for the payment of damages for the taking of the water, but further that (within certain extreme limits of pond level) the city could not maintain the level of the water in the North Pond more than one inch above the level of the water in the South Pond. The practical effect of this regulation is that the private corporation, the Reservoir Company, can draw down the South Pond at will, and the city, no matter how badly it needs the water of the North Pond for its domestic supply, is compelled to make good this withdrawal by transferring water from the North Pond to the South Pond until the difference in level of the two ponds does not exceed one inch. So far as regulation of the North Pond storage is concerned, the city is at the mercy and caprice of a private corporation. Furthermore, this private corporation is paid for the loss of the water which the city uses for domestic purposes, an agreement having been reached after long controversy by which this payment is effected by the abatement by the city of the taxes assessed on the value of the water privileges of the lower Quequechan for power purposes.

In the matter of its water supply, then, Fall River is in a unique position, for not only does it not own its source of supply, but it has no power to regulate the conservation of its water, and furthermore, must pay tribute to a private corporation for the privilege of taking water for municipal purposes.

QUEQUECHAN RIVER—RECENT CONDITIONS.

During the last forty or fifty years there has been a considerable increase in the number of mills on the upper portion of the Quequechan, and with the introduction of condensing engines large quantities of water were needed by these mills for cooling their condensers, in addition to that

required for boiler feed, and for bleaching, dyeing and sanitary purposes. The use of the water has now become so extensive that the interests of all parties demand careful conservation of all waters available for industrial purposes; but, notwithstanding this fact, the Reservoir Company, the association of mill owners on the lower portion of the stream has proceeded to the present time with little coöperation with the large number of mills on the upper river.

For example, one would think that naturally the waters of the ponds tributary to the South Pond would be stored, so far as possible, in wet



Settling basin receiving waste condenser water from several mills. Crude sewage is also discharged into this basin. Note the boys bathing in this polluted water.

seasons, to make up deficiency during dry seasons, but such is not the case. The Troy Mill and others, it is understood, on the lower portion of the stream, use the water for power purposes (for the turning of water-wheels) when the level of the South Pond is not more than one foot below full pond level, this height of pond being reached almost every year during the spring freshets. It being to the interest of the mills constituting the Reservoir Company to prolong the period when water may thus be used for power purposes, Sawdy and Devol Ponds are naturally drawn down in the late spring, just as soon as the level of the South Pond approaches one foot below full pond level, with the result that, during the summer and fall when water is most needed by mills on the upper river, Sawdy and Devol Ponds have been already drawn down to their minimum level and can contribute nothing toward the flow of the Quequechan.

As the result of the lack of a broad policy of conservation and regulation of the use of the water, there is a period each year when the river is drawn down so low that it seriously handicaps the manufacturing interests and creates in the otherwise attractive stream a most unsanitary condition of affairs—a nuisance of an aggravated sort in the very heart of a city of 125,000 population. The nuisance is the more aggravated from the fact that the river is the natural means of draining a considerable area of the city, a portion of which is still unprovided with sewers.

FORMATION OF THE WATUPPA PONDS AND QUEQUECHAN RIVER COMMISSION.

While Fall River people generally have not as yet become thoroughly aroused to the need of improving conditions along the Quequechan River, those most conversant with the situation are keenly alive to the potential menace of the stream and the necessity for conservation of the water to permit future increase in the number of mills. The health of the community as well as the future industrial growth of Fall River demand that something be done.

The matter was brought officially to the attention of the citizens in 1910 by a report on the Quequechan River issued by the city's Reservoir Commission, the official body charged with the duty of protecting the purity of the water supply; it being found that measures proposed for the protection of the North Watuppa Pond would affect also the South Pond and the river. Fortunately the matter was not allowed to drop and in 1913 the legislature passed an act which permits the whole situation to be handled in the most comprehensive manner.

Under this act there has been created a board of five commissioners, appointed by the Mayor of Fall River, and confirmed by the Board of Aldermen, known as the Watuppa Ponds and Quequechan River Commission, which is charged with the duty of making "a careful investigation of the whole subject of the nuisances in and along the line of the Quequechan River or upon or about lands or flats or waters adjacent or near to said river, and of the needs of the city for the increase, purification, protection and control of its water supply and the conservation and improvement of the waters of the Watuppa Ponds and of all brooks, streams and water sources contributing thereto." The commission is further directed "to make necessary surveys and examinations and prepare and submit to the state board of health for its approval, comprehensive plans, showing in detail full and complete methods for the abatement of the nuisances aforesaid, for the control and direction of the waters of the Quequechan River, for proper drains for surface water and sewers for sewage, and for the increase, purification, protection and control of the water supply of the city."

As the work progresses, the commission will give public hearings upon its plans to all parties interested or affected, and after the project has received the approval of the state board of health, a full report covering

the whole planning is to be presented to the Fall River City Council, which body will determine whether the scheme is to be carried out.

SANITARY SURVEY OF THE QUEQUECHAN RIVER.

The Watuppa Ponds and Quequechan River Commission has instituted an investigation of the nuisances in and along the line of the Quequechan River. To any one who visits the river at periods of low water, it is strikingly apparent that the sanitary condition of this stream is one which should not be tolerated in the heart of any city.

The pollution of the stream is mainly due to the fact that over two square miles of the area tributary to the river, either directly or by drainage into the South Pond, are not provided with sewers of any sort. Within this unsewered area are located numerous industrial plants with a considerable residential population, and as the future growth of the city must inevitably be largely upon portions of this area now vacant, conditions will rapidly grow worse unless definite action is taken.

Sources of Pollution Above Watuppa Dam.—The chief sources of pollution of the stream are the manufacturing establishments which have no sewer connection, and from which sewage and mill wastes find their way into the river. At least sixteen specific instances of extensive sewage pollution from mills, or other manufacturing establishments are known. From two or more mills employing over a thousand operatives crude sewage is found discharging directly into the Quequechan along with the waste from the condensers. In the case of fourteen mills employing some six thousand operatives, cesspools are provided to receive the mills' sewage, but these cesspools overflow into the river. The sanitary survey of the stream disclosed the fact that at several of the mills and at other places there are privies discharging directly into the stream.

In five cases there are storm sewers emptying into the river which not only take the surface drainage, with whatever surface pollution there may be, but which, also, in at least three cases receive the overflow from sanitary sewers. These sewers are at Plymouth Avenue on the north and south sides of the river; at Lowell Street on the south side of the river (where a large storm sewer just built is about to be put into service); and at Quequechan Street and at Choate Street on the north side of the river.

Of the miscellaneous sources of pollution, the principal ones are the discharge of dye or bleachery wastes from the mills. At the Stevens Manufacturing Company, bleachery wastes, as well as sewage are discharged into the settling pond which overflows into the river. At the Barnaby Manufacturing Company's mill dye wastes are discharged into a double cesspool which drains into the river. At the Massasoit Mill dye wastes are discharged directly into the river.

Notwithstanding the extensive pollution of the stream, the Quequechan River is largely used in the summer months as a bathing place.

The Quequechan Flats.—It has already been stated that the original width of the Quequechan River was about one hundred feet, but that by the building of the Watuppa Dam, the banks of the stream for nearly two miles in length were overflowed until about two hundred acres were covered by shallow flowage at times of high water. A portion of these flats have been filled in, but there still remain over one hundred and sixty acres outside of the original river bed which are overflowed during the wet season of each year, and which are either uncovered entirely, or flowed only to a



Low water view of Quequechan River looking down stream from Quequechan Street Bridge, showing exposed flats covered with sediment of silt, sewage and mill wastes.

depth of a few inches during the dry months. The flats are covered with a sediment consisting of a mixture of silt, sewage and mill wastes. When covered by water, gases are seen rising to the surface denoting chemical activity which is taking place in this sludge; when uncovered, these flats are offensive both to the eye and to the nose. At many places along the stream vegetation is abundant and the flats approach the conditions of a swamp, while the banks at several places have been used as dumping places for various kinds of city refuse.

The Quequechan River Below the Watuppa Dam.—Below the Watuppa Dam, the river flows beneath streets and numerous buildings, and is exposed to view for only small portions of its length. Its general direction is through the Troy Mill yard crossing underneath Third and Second Streets, running beside the City Hall and beneath South Main Street, and then falling

through a succession of falls, parallel to Pocasset Street, the natural outlet being into Mount Hope Bay at Central Street, a short distance north of the Fall River Line wharf. Except at flood times the entire flow of the stream is diverted into Crab Pond, however, from which water is taken for the use of the American Printing Company.

Because this portion of the stream is covered up for the greater part of its length, few people have any knowledge or conception of its condition. An examination of the river when the water is shut off at the Watuppa Dam, and the lower river bed is exposed, shows that for a considerable part of its length the stream is filled, often to a depth of several feet, with the accumulated silt, sewage and other filth of many years. The depth of the sludge at many places, to say nothing of the odors arising when it is uncovered, make it impossible for a human being to traverse the length of this portion of the river. Description is not easy, and one should see for himself to realize the extremely filthy condition of the river existing in the covered recesses beneath the streets, business blocks and mills in the very center of Fall River's business district.

THE PROBLEM BEFORE THE WATUPPA PONDS AND QUEQUECHAN RIVER COMMISSION.

So far we have discussed mainly the sanitary condition of the Quequechan, and this is perhaps of chief importance as it bears directly upon the health of the inhabitants of Fall River. Considering that the river carries the sewage from thousands of mill operatives, that the stream is used freely for bathing purposes, and that this polluted water is employed for various industrial uses in the mills, it is perhaps remarkable, and certainly fortunate, that the city has escaped serious epidemics, for surely the conditions are favorable for spreading disease.

The sanitary question however is but one of the many sides of the problem confronting the Watuppa Ponds and Quequechan River Commission. Next in importance is the supply of an adequate quantity of clean, cool water to the mills of the upper portion of the stream. At present these mills require from 25,000,000 to 30,000,000 gallons of water daily for condenser purposes, while in a dry season the flow of the river may fall as low as 5,000,000 or 6,000,000 gallons per day. These mills, then, have to use the water over and over again and as the water discharged from the condensers comes out at a high temperature and more or less polluted with oil, the temperature of the river water is raised at times to considerably more than 100 degrees F., resulting in a loss of efficiency in the condensers and the burning of more coal; and, further, the water of the stream is coated with a film of oil. In dry times, too, the mills below the Watuppa Dam suffer for lack of a sufficient quantity of water; and if, by proper regulation of the flow, from 15,000,000 to 20,000,000 gallons can be

supplied to these lower mills every working day in the year instead of the present minimum amount of 5,000,000 or 6,000,000 gallons, they will also receive considerable benefit.



View of shore of river alongside Plymouth Avenue showing growth of vegetation and semi-stagnant condition of water.

Then there is the problem of rail connections to the upper mills. Although the Fall River and New Bedford Branch of the New York, New Haven and Hartford Railroad runs the whole length of the upper Quequechan as far as Plymouth Avenue, but two or three of the many mills are provided with sidings, presumably mainly because of the expense of building and maintaining trestles across the flats, and the freight at present is teamed. In any scheme for the improvement of the river, attention should be paid to providing adequate railroad sidings to the mills.

Incidental to the railroad problem, also, is the question of the present or future elimination of grade crossings at Quequechan Street and in the vicinity of Plymouth Avenue, while under the head of transportation is to be considered the possibility of the building of one or more new streets in this valley.

The Commission is charged further with the duty of making an investigation of the Watuppa Ponds' watershed, not only to determine the best means of conserving the waters of these ponds and their tributaries for industrial purposes, but also to study the needs of the city for the increase, protection, purification and control of its water supply which is now taken from the North Watuppa Pond.

Lastly, but by no means least, the Commission is directed to plan comprehensive systems of sewers for the two square miles of territory tributary to the Quequechan which is now unsewered; these sewers to be on separate systems, sanitary sewers taking the sewage to tide water in Mount Hope Bay and storm sewers to take the surface water to the South Pond that every drop may be conserved for industrial uses. In addition, sanitary sewers are to be provided for an unsewered district on the west shore of the North Pond. These sewers will vastly improve the sanitary condition of the heart of Fall River and without them no adequate solution of the problem of the nuisances along the Quequechan could be found.

Truly the problem is many sided and rarely does a community have one more complex or more diversified.

THE REMEDY.

Several schemes of sanitation and conservation have been suggested, but the best solution of the problem appears to be, in general, along the lines here outlined. These provide for the construction of a cold water canal from the South Pond to the Watuppa Dam, with a dam at the pond outlet to conserve flood waters and regulate the flow. From this canal an abundant supply of cold water may be drawn by the upper mills while a steady and largely increased minimum flow of water will be allowed to pass down stream to supply the needs of the lower mills. The hot condenser water coming from the mills will not be allowed to enter the cold water canal, but instead will be returned to the South Pond by means of hot water return conduits in connection with which cooling ponds may be provided. The present unsightly and unsanitary flats are to be filled, thereby not only effecting an abatement of their nuisance but at the same time providing additional land areas which will be exceptionally valuable as sites for new mills and which will go far toward offsetting the cost of the improvement. Additional mill sites are needed if Fall River is to continue in its industrial growth.

In connection with the canal a street has been suggested, which would follow the canal from Pleasant Street, or from Plymouth Avenue, as far as Quequechan Street, and there branch off to connect with an extension of East Warren Street.

Fall River is by no means indifferent to the situation; on the contrary she is alive to the necessity for action, and is attacking her problem with vigor and in the most thorough way. The investigation has not yet proceeded far enough to enable the Commission's plans to be given in detail, but from this brief account some idea may be had of the magnitude of the task. It is easy to see that Fall River is confronted with a million dollar project in municipal housekeeping.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

The regular quarterly meeting of the Association was held at the Brunswick Hotel, in Boston, on Thursday, October 29, 1914.

The meeting was called to order by the President, Mr. James C. Coffey, of Worcester.

The following named persons were recommended for membership by the Executive Committee and were duly elected by vote:

Dr. Philip Castleman, Board of Health, Boston, Mass.

John A. Cook, Board of Health, Provincetown, Mass.

Fred S. Dodson, Board of Health, Wellesley, Mass.

Charles W. Eaton, Board of Health, Duxbury, Mass.

Dr. W. L. Eisner, Board of Health, Pittsfield, Mass.

Stephen H. Foley, 34 Union St., Attleboro, Mass.

Curtis M. Hilliard, 87 Middle St., Braintree, Mass.

Dr. F. M. Lowe, 1354 Washington St., Newton, Mass.

E. C. Morgan, Board of Health, Truro, Mass.

Dr. Ezekiel Pratt, 374 Massachusetts Ave., Arlington, Mass.

Dr. Edward S. Ward, 42 High St., North Attleboro, Mass.

The Executive Committee recommended the following named members for appointment as a Committee on Nominations and it was voted to so appoint them: Dr. E. H. Stevens, of Cambridge; Dr. C. V. Chapin, of Providence; and Dr. A. S. Macknight, of Fall River.

Dr. Geo. L. Tobey of Clinton, chairman of the Committee on Legislation, presented a letter from the Joint Special Committee on Legislative Procedure calling attention to a hearing on the 10th, 11th and 12th of November to persons interested in such changes in the rules of the general court and in the general law as will tend to expedite legislation, and will ensure better consideration of the same to avoid constant revision of the general law. It was voted to refer this matter to the Executive Committee.

Mr. Frederick H. Fay of Boston then read a paper entitled "Quequechan River Improvement," Fall River, Mass. (This paper appears elsewhere in this issue.)

QUESTION MEETING.

The President: I want to say that the rest of the programme today is an innovation in the history of this organization. It has been thought that by establishing one of our quarterly meetings as a question meeting in which perplexing problems that arise daily in every health officer's life might be brought here for discussion, some of the members may be able to throw light upon them and thereby aid the particular town in which

a question was found perplexing. So today we have a series of questions. They are rather numerous and lengthy and you will notice that a time limit has been fixed. Owing to the length of the programme it will probably be necessary to confine the members to the amount of time that is here designated—five minutes for the opening and three minutes for the discussion by each member speaking.

QUESTION 1.

Should the results of milk analyses be given publicity? Discussion opened by G. E. Bolling of Brockton.

Mr. Bolling: In reply to the question "Should the results of milk analyses be given publicity?" I will say that such should be the case in general but with certain qualifications, however.

Let us assume that under the conditions that exist in this state—which are, of course, what we are most interested in—a local board of health is collecting samples from the wagons and stores of dealers and subjecting these samples to analysis. During the course of a year probably at least a dozen samples are collected from each dealer, the data from which when averaged should tend to show the average condition of that individual's product for the year. Some boards of health present these yearly averages in their annual reports from which any citizen who cares to can ascertain the rating of any particular dealer.

I believe this is one of the fairest ways of making public the result of such tests because those of us who have been sufficiently close to milk inspection work know that even in the best regulated dairies accidents are not unapt to happen. For example, not all hired help can be depended upon to exercise the same care in the handling of milk when not under the watchful eye of the owner or foreman as they do when under supervision. I have known a dairy to go ten months of one year with a bacteria count that averaged under 10,000 to the cubic centimeter, and then one day when the chief herdsman was called away by illness, a recent acquisition to the force of dairy hands milked a cow that was being kept apart from the herd on account of garget which resulted in a sample being collected from the wagon of that dairy the next morning that yielded a count of over a million to the cubic centimeter, chiefly the streptococci that were occasioning the disease in the infected animal.

Now, if in that city the custom obtained of advertising in a newspaper the results of each and every sample collected, many readers might have secured their sole information regarding that dairy from the one bad sample. Thus it must be apparent that from the indiscriminate advertising of all results cases will occur where dealers may be subjected to loss of trade,

and what is fully as much to a conscientious dairyman, loss or disturbance of his peace of mind.

In my opinion, the reputation of any dealer's or dairy's product should be given every possible consideration by the authorities and this applies to the results of chemical analyses as well as bacteriological examinations.

In Brockton we have had a bacterial standard of 500,000 per cubic centimeter for nearly nine years and from the very first have observed the ideas I have endeavored to convey. During that time it was deemed necessary to prosecute eight dealers because of persistent violation of the bacterial regulation, all cases resulting in convictions and payment of fines. Such prosecutions as well as those conducted for adulteration of milk by watering or skimming we found quite unnecessary to advertise as the local papers were quite willing to treat the matter as news.

What I have said applies to our city with a population of between 60,000 and 70,000 with some 102 wagon dealers and 270 store dealers licensed to sell milk. Whether these methods would suffice in a much larger city where nearly all the milk is supplied by a few contractors I am unable to say.

To answer the possible objection that yearly publication of records is insufficient I will add that the chief aim of securing for any community a milk supply with a low bacterial count is to render such supply a safe food for infants. In Brockton the Health Department mails immediately to every family in which a birth is reported a circular dealing with the care of the infant and the care of milk in the home and a request that the family consult with the Department regarding their choice of a milk dealer. This, we believe, employs a certain form of publicity exactly where it will achieve the best results.

S. H. Durgin, M. D., Millbrook, Mass.: This has been in years past one of the perplexing questions in all cities. Some years ago I consulted the Corporation Counsel of Boston, and he thought there was certain doubt about the authority of the Board of Health to advertise the results. I concluded I had better take his advice at that time. I hope the time is coming when the authority may not be doubtful, when this may be legally done. There is no doubt in my mind whatever that it is the best method by which people can get rid of unclean milk if they desire to. If these figures are published nobody can complain if they continue to take what they may properly call dirty milk. It does not seem to me, aside from the disease-bearing germs, that we should be particular whether people want to take dirty milk or not; I believe we might leave it with them to say. I can merely say for myself that I believe it to be the easiest, the fairest and the best method of treating the dirty milk question.

Mr. R. N. Hoyt, Coöperative Boards of Health, Wellesley, Mass.: As Milk Inspector for a group of towns in the vicinity of Wellesley, I am very much interested in this problem. Several towns with which I am connected have been publishing a monthly report in the local newspaper. They believe that the information given in the annual report is very ancient history, and that it is read by very few people. The methods of publication in our various towns have not been identical. In one town, the milk analyses for four preceding months

are averaged and published each month. In other towns, the individual analyses for the two or three preceding months are all printed in detail. The problem of securing the purification of certain mill wastes discharged into nearby rivers has been solved by making purification and the saving of profitable by-products. We believe that the milk problem is to be solved in a similar way. Publicity of milk analyses makes the sale of clean milk profitable. This method has the advantage of avoiding arbitrary and low standards. The Boston standard, limiting the bacteria count to 500,000 may be the best practicable for a large city, but it is not what any of us would deem to be satisfactory. A bacteria count of 400,000 is too high if we can secure something better. Publicity has a second advantage, acting as an incentive to the good milkman as well as to the dealer who sells very bad milk. By simply printing the results of the analyses, you induce them all to work for an ever better record.

I am very much interested in the legal aspects of the question and would be very glad if there are any lawyers here who have studied the legal aspects to have them present that feature of it. In one town, the milk dealer threatened to bring suit in case the milk analyses were published. The editor of the local paper was willing to take the risk as he thought he was doing a good thing for the town. The dealer did not bring suit.

Dr. Maloney, of Fall River Board of Health: I do not believe in the policy of publication of laboratory findings. They are very apt to be confusing and misleading. A pretty small fraction or percentage of the people would be able to read the laboratory findings intelligently. A majority of the people who would be benefited in clean milk do not read every newspaper. Laboratory findings are valuable only to officers of a well-regulated milk inspection system; outside of that they mean very little. Five hundred thousand of anything is an enormous sum to the lay mind, whether it be bacteria or dollars; to the average man it means about the same. The publication of a report which shows that a man's milk supply contains 200,000 bacteria per cc. this month, 500,000 next month, and 1,000,000 the next month, means absolutely nothing to the public. A very small percentage of the public would even read the statistics if they were published daily in the public press. Therefore I believe the problem of proper milk inspection is frequent, regular inspection of dairies and milk plants carrying with it information and instruction to the producer and dealer.

I believe it is wrong to say "A board of health has done its duty when it has published a report of conditions which it considers dirty or insanitary" and that "we are not interested whether they accept our reports or not."

I believe it is the function of a board of health to see to it that the public are protected against themselves. The mere publication of laboratory findings of milk examinations, which a large proportion of the public cannot understand, would be of no benefit, and therefore would not fulfill the function required of a board of health.

Dr. Rosenau, of Harvard Medical School: Mr. President, I believe in publicity but I also believe that the methods used in publishing should be carefully considered. The question at issue well illustrates the point. I don't believe that the milk problem can be solved by publishing the bacteriological results in detail, nor by publishing the chemical results in detail, nor by publishing the results of the sanitary conditions of the farm in detail. The important thing, to my mind, is to classify and grade all milk. We may well conform to the government classification into three grades, A, B, and C. Grade "A" milk is certified milk or its equivalent; Grade "B" milk is inspected milk, and Grade "C" milk is market milk. Now, everybody knows that A is better than B, and B is better than C. These grades are based upon the composite results of all that is known about the milk, including the results from the chemical laboratory, the bacteriological laboratory, and the sanitary inspection of the farm; also the conditions of transportation, the temperature, cleanliness, health of cattle, personnel, and all other factors. It is the sum total of all we know about the milk. If the barn is clean, the dairy methods good, the cattle tuberculin tested, the cans, pails, and bottles scalded, the milk chilled and kept cold and delivered while fresh, and if the personnel are free from com-

municable diseases, and, furthermore, if the milk has a low bacteriological count and proper and uniform chemical composition then we have Grade "A" milk. Grade "A" milk sells for from 16 to 20 cents a quart; Grade "B" milk for 12 cents a quart, and Grade "C" milk for from 8 to 10 cents a quart. The grading of milk greatly simplifies the problem. It helps the producer to get more money for a better quality of milk. It helps the consumer in being able to easily know what he is buying. Everybody understands a simple system of grading, whereas they have difficulty in interpreting the number of bacteria per cubic centimeter or the percentage of butter fat. Therefore, I think the results should be published not so much in detail but as a final summing up of qualities as indicated by Grades A, B, and C.

Mr. Howe, of Framingham Board of Health: I agree with what the last speaker has said about the Massachusetts statutory standard, but in Framingham we have a number of individual dealers who have small amounts of milk. I would like to ask how we could classify the milk so as to get our three grades. Could you ask an individual dairyman who is supplying say not more than 200 quarts to pasteurize it provided it did not fall into class A? Do you think the time is ripe in a town the size of Framingham, of 15,000 inhabitants, to inaugurate a scheme of that sort?

Dr. Maloney, of Fall River Board of Health: May I answer that question? We have just such a scheme in Fall River; we have our milk classified into A, B and C grades. The A grade consists of milk that conforms to all the requirements and regulations of the board of health plus its recommendation. Grade B milk is milk that conforms to all the requirements. Grade C milk is milk that does not conform to their requirements and recommendations and cannot be sold as raw milk, it must be sold as pasteurized milk. Here we have the same problem: Our milk supply is furnished by a number of small producers, they are required to conform to all the requirements, and if they meet the requirements, plus our recommendation, they are given the right to advertise that they are selling milk graded by the board of health as A.

Mr. Howe: May I ask if you had any difficulty in getting those small dealers into that list?

Dr. Maloney: We began that system about fourteen months ago and now we have about six men producing Grade A milk. Practically all of our men are producing Grade B milk; and as we have no pasteurizing plant in the city we have no Grade C milk.

Dr. Croston, of Haverhill Board of Health: Representing the city of Haverhill, we have been reporting our milk analyses for the last three years in the newspapers and we have had no legal difficulty whatever. We have not prosecuted a single man in that time but we have noted a gradual falling off in the bacteriological count and a gradual improvement. And we report that we not only favor the publicity but we think it is encouraging a spirit of emulation among the producers and for that reason we propose to follow this course.

Dr. Calvin G. Page, of Harvard Medical School: In confirming what Professor Rosenau fairly said I would like to call your attention to two reports from Geneva, N. Y., by the Agricultural Experiment Station, one for April, 1911, No. 337, and the other for April, 1913, No. 363. In that town they carried the point by means of the dairy scores published as part of the minutes of the board of health and in three years eliminated all the poor grade milk. An inefficient inspector came on duty, the farmers lost the stimulus of having a chance to get more pay for their better grade of milk, and their milk deteriorated in quality. These reports suggest that the financial stimulus to the farmer by virtue of impartial inspection and higher prices for the better grades of milk is a most important factor.

QUESTION 2.

Of what value is house fumigation after infectious disease? Discussion opened by Dr. C. V. Chapin of Providence.

Dr. Chapin: Mr. President and Gentlemen: For a dozen or fifteen years previous to 1900 I tried to disinfect houses in the best possible manner. We were the first city to use a steam sterilizer. We abandoned sulphur and used formaldehyde about as soon as anyone, and continued this up to about 1900. Then I began to ask the question which has been propounded today: What good is disinfection? Why do we disinfect? I was led to ask this question largely because we had begun to learn two things: one, that germs die pretty quickly after they leave the body, and the other that the unrecognized cases and carriers are the chief cause of the spread of infectious disease. After considering the question for some time I made up my mind that there were two reasons why we disinfect. One reason is the same reason that we sew buttons on our coat-sleeves—because our ancestors have done so for several hundred years. The only other reason offered is this: That one occasionally finds a physician, a health officer or an old woman who says that little Johnnie caught the scarlet fever because he played with a toy belonging to some other child who died of scarlet fever a year or two before. No one that I know of ever offered any real proof of the value of disinfection. It seemed to me that the best way to find out was to give up disinfection, and see what happened. So we abandoned disinfection after diphtheria in Providence in 1904. We have had no more recurrences of the disease since then than before. Both before and after giving up disinfection we found recurrences after the termination of isolation in between one and two per cent. of the cases. I became so well satisfied that disinfection, so called, is of no use that later we gave up disinfection after scarlet fever. The result was the same. The number of recurrences after we gave it up was practically the same as before. You might perhaps say that our method of disinfection in Providence was not good and that I am simply comparing a period of poor disinfection with one of no disinfection. But the city of Baltimore has been very careful about disinfection and tests by means of cultures and if it is not efficient they send the man back to do it again. There recurrences are about the same as ours. Another way to test the value of disinfection is this: We send away many children from diphtheria and scarlet fever houses, when the disease is recognized and the house placarded, and we keep them away until the period of isolation has terminated and then let them come back. Now if the house is very infectious they ought to contract the disease. About eight tenths of one per cent. of several hundred children brought back to diphtheria houses while we practiced

disinfection, contracted the disease. After we gave up disinfecting it was only five tenths of one per cent. About the same thing happens in scarlet fever. Now it is worth while to consider what happens when children, as soon as the disease is recognized, are taken to a hospital, in both scarlet fever and diphtheria, and particularly in the latter disease. After they return home from the hospital they at times cause infection in the family. They go home at about the same period of the disease at which isolation would have terminated if they had stayed at home. Coming back at this time, there are always a certain number of reinfections or recurrences in the same family. In such cases it is almost certain that the child from the hospital is the cause, and not infection remaining in the house. It certainly is the child who comes from the hospital that does the harm. If in such cases it is the child and not the house that causes the infection, have we any ground for assuming that it is the house which causes the infection when the disease recurs after home isolation? I think we can believe that the house and the things in it are negligible factors in the recurrence that takes place after the termination of isolation. You may argue that the recurrences mean little because most of the susceptible children of the family have been affected before the disease is recognized or within a few days thereafter. But we have still another way of learning whether disinfection does any good. Does disease increase in the community when it is omitted? It did not in Providence; for a few months after we gave up disinfection for diphtheria there was a time when we did not have a case in the city. There has been no more scarlet fever and diphtheria in Providence since we gave up disinfection than there has been in other New England cities.

Dr. Carroll, of Lowell Board of Health: Mr. President, I would like to ask Dr. Chapin as to his observation as regards tuberculosis, whether he has done anything in that line at all.

Dr. Chapin: Mr. Chairman, I have never been able to get any evidence as to the value of disinfection after tuberculosis. The disease is so slow in developing that it seems to be impossible to get any data. Dr. Woodward in Washington, has published data which on their face indicate that disinfection is of great value after tuberculosis, but it never seemed to me that the figures proved much, for the reason that in a large portion of the cases it is impossible to find where the disease was contracted.

A Member: I would like to ask Dr. Chapin if he believes in the proper disinfection of clothing that has been in close contact with a patient.

Dr. Chapin: I think it is desirable, if possible, to carry out disinfection all through the disease, to keep everything clean and free from infection as much as possible. I would like to have everybody do this but practically I think there are very few who do.

Dr. Gardner Swarts, Secretary R. I. State Board of Health, Providence, R. I.: Dr. Chapin always gives us the practical results in these questions. Let us consider them from the laboratory side. What may we effect by fumigation? Our bacteriological tests inform us that the fumes of sulphur are not destructive to bacterial life. Formaldehyde gas may be effective, but must be applied under certain prescribed conditions. A room must be sealed tightly; the gas in the room must be made a certain pressure; a particular temperature must be maintained; and a degree of humidity. I have yet failed to know of a health officer who was

equipped with thermometer, hygrometer and pressure gauges. Since none of these methods are effective, why go through these motions and produce a fake sense of security when we know all the time that the infectious material is maintained longer in the throat of the patient than in the atmosphere outside?

QUESTION 3.

How may the best results be obtained in the care of the incorrigible consumptive in towns where there are no hospitals? Discussion opened by Dr. E. O. Otis of Boston.

Dr. Otis: Mr. Chairman, I think we might define the incorrigible consumptive as he who willingly or unwillingly, ignorantly or viciously, exposes others to infection in his community or his family in his own house. This question is one that has arisen in every state and has been provided for in some of them by the enactment of a special law. The states of Ohio and New Jersey, for example, have special laws in regard to it whereby a consumptive can be taken to a hospital and isolated. If the law which was proposed by the recess committee appointed by the legislature of 1913 to the legislature of 1914 had been passed, we also would have been provided for this condition in the state of Massachusetts.

HOUSE NO. 931.

AN ACT RELATIVE TO THE REMOVAL OF CERTAIN PERSONS INFECTED WITH TUBERCULOSIS.

Be it enacted, etc., as follows:

1 Whenever it shall appear to the state board of health or to a local
2 board of health that, by reason of improper care, improper household
3 conditions, or improper habits, the condition of a person suffering
4 from tuberculosis is such as to endanger such person or his family or
5 the public, and that the conduct of such person with regard to his
6 health is not governed in accordance with the advice of a person
7 competent to advise with regard thereto, such board of health may
8 request the justice of the police, municipal or district court having
9 jurisdiction in the district wherein such person resides to order his
10 removal either to some proper institution for the care of tuberculous
11 patients in the locality in which the patient resides or to some institu-
12 tion maintained by the state, and such person shall remain in such in-
13 stitution until discharged by the authorities in charge thereof: *provided,*
14 *however,* that, whenever the patient shall so request, the authorities
15 in charge of said institution shall notify the justice of the court which
16 has taken original cognizance of the case of the desire of such person
17 to be discharged, and thereupon, after hearing, the court may order
18 such discharge or take such action with regard thereto as may be
19 deemed expedient. Any authority in charge of such institution shall,
20 upon failure to communicate the request of a patient as herein pro-
21 vided, be deemed in contempt of the court having jurisdiction of the
22 matter.

If that law had been passed, then the local board of health could have appealed to the State Board of Health and the incorrigible patient by the procedure here outlined would have been taken to the state hospital at Tewksbury or some tuberculosis hospital. The board of health in Boston either has or had assumed the authority to do that very same thing. The local boards of health apparently do not dare to do so. They do it in New York City. Now it seems to me that the wise local board of health can or should assume more power in certain cases when the health of the community is at stake than the strict letter of the law allows them to. I remember Dr. Darlington, who was commissioner for health in New York, told me he not infrequently went beyond the law in the protection of the public health and he never got into any trouble. It seems to me that the local boards might in the same way take some risks of a lawsuit in the protection of the public health by the forced removal of an incorrigible consumptive. The state now requires all localities of 10,000 inhabitants or more to establish local consumptive hospitals and when this is done, if the small town is in the vicinity of one of them the board of health of the small town might arrange with the authorities of the nearest consumptive hospital and hand over to them its incorrigible consumptive, taking the law into their own hands so to speak. Failing in this, I do not see what can be done except careful and constant supervision by the local officers or by the physician or by the visiting agent of the incorrigible consumptive. A great deal can be done with the incorrigible consumptive by careful supervision, education and training. He can be told he may reinfect himself or lose all his chance of getting better if he is not careful in disposing of his sputum. And I do not see why after being warned it could not be considered a misdemeanor to disobey the instruction of the board of health. If he is indigent, as I suppose such cases are as a rule, and is supplied with public aid, that might be cut off until he reforms. You can think of a number of things boards of health might do to protect the family of that ignorant, wilful consumptive who was exposing them to infection. But, gentlemen, this problem is not confined alone to the indigent consumptive. You and I know perfectly well that there are plenty of intelligent consumptives who are able to be about their work, who maintain an equilibrium between their toxæmia and their resistance and yet who have advanced tuberculosis, and are emitting all the time tubercular bacilli. It may be a professional or business man, and yet on account of his social or business position he is afraid to take all the precautions, although he knows well enough what they are. You recall the incident of a doctor in New York who took a sputum cup and went into one of the elevated trains and pretended to have a tremendous cough and then expectorated into the cup. Very soon, everybody left that car and he was alone. The consumptive who is willing and would like to exercise all these precautions knows that

he will be ostracised from society, he will lose his business if he does it. Or if it is a workman who is perfectly willing to carry out all the precautions necessary, he knows well enough he will lose his job if he uses the sputum cup and so expectorates upon the floor. This is one of the problems that is not yet solved.

The problem of the incorrigible consumptive, whether in small town or city, can only be definitely solved by a specific law empowering the board of health to remove the offending person to a consumptive hospital, and by providing such a hospital for this class of cases. Furthermore, the public must be taught that a consumptive who properly disposes of his sputum is not a menace.

Dr. Kent, of Attleboro: We have had recently three such cases in Attleboro and each time we have succeeded, after giving the patients all the care and instruction that we could, both by the board of health and the district nurse, in having those patients, with the aid of the court, sent down to the State Farm at Bridgewater where they cease to be a menace to the public health of our town.

Dr. Coolidge, of the Lakeville State Sanatorium, Middleboro, Mass.: The incorrigible consumptive is not disposed of when he is landed at a state institution, because he may still remain incorrigible. If he remains incorrigible inside the institution so that we cannot keep him there, he is sent back into the hands of the town which sent him. So the problem is more far-reaching, it seems to me, than we have supposed it to be. To my mind—and I have maintained it ever since I have been conducting one of the state institutions, the Lakeville State Sanatorium—we shall never get this matter in hand until an institution is provided either in connection with some of the institutions already in existence or in a new institution, for the compulsory segregation of incorrigible consumptives. And the incorrigible consumptive is not necessarily a criminal or a malicious person. I should rather call them unteachable consumptives because we have many highly respectable people at our sanatorium who come in an advanced stage of the disease and who in giving a history of their disease say, "Doctor, I don't believe I have got consumption." I believe that man is just as much a menace to the community as the drunkard or the malicious person. I believe the compulsory segregation of these unteachable consumptives is absolutely necessary.

Dr. Kent: I would like to say that these three men were sent to Bridgewater for an indefinite term; they cannot get away from there.

Dr. S. H. Durgin, Millbrook, Mass.: I have yet to learn that there is not law enough in Massachusetts to empower every board of health to convey an incorrigible consumptive to a hospital and to keep him there until he is a safe person to go about. It is the place where you can control him, not through the courts or any other institution. I don't know how it is since I left the board, but when I was a member of the board of health of Boston the only obstacle we had in front of us was the lack of hospitals. We filled every bed as long as there was one left for us, we begged others in town and out wherever we could.

A Member: I would like to ask in regard to the cases sent to Bridgewater from Attleboro, how that was brought about. It is hardly possible to believe it was done because of their having consumption.

Dr. Kent: I would like to say it was done not on the ground that they had consumption, but it was done on the ground of their being a menace to the public health.

Dr. Durgin: He is the only person for whom I have any remark to make. The person who is intelligent in his home and in public may still pursue his avocation and not be a menace to the community, but he who is a menace to the community and is so looked upon by the

board of health, I believe it is their duty to find a hospital if there is one within reach and then seize that person and put him where he belongs. I would encourage everyone to take such care of himself, his family and the public that he should be no menace; I would do everything possible to teach them to do that. It can be done. I would not confine a patient anywhere unless I knew the man to be a menace.

Mr. F. A. Sullivan, of Board of Health of Haverhill, Mass.: The question that is before this body for discussion is a question that has been foremost in the minds of our local board for some time. We have an institution in Haverhill with a capacity of thirty beds. Previous to this time we have had some consumptives, incorrigible and everything else that could be applied to an individual. Now as regards the bill of Dr. Otis, I think that bill does not go far enough. In order to get a man committed to an institution he has got to go before a justice of the court and if that man sees fit he has got to have a hearing. Now we all know that judicial minds are at times very sympathetic, and, with all due respect to our courts, we find they do not coöperate with our boards of health in the communities in which we reside. Within the past ten years a justice of the local court made the remark to the board of health that boards of health did not run everything within their own precincts or their own municipalities. We have one instance of a certain man who has cost the city about \$1,500 or \$1,600 for his board in various places. He dictates to us where he shall go. He refused our suggestion to live in one of the best hotels in town and he has gone to Reading; has come back to Haverhill and notified us he was there. When he sees fit he leaves the institution and we get hold of him and bring him back again. Recently this man has been before the local court. It was impressed upon the court how dangerous he was and that the best he could do was—we said almost as much as to say it—to send him to Bridgewater; but in that attempt we failed. I think this bill should be so changed that a commission should be appointed in fairly large districts where this commission shall have control over those individuals. I suppose the city of Haverhill may have been one of the first of the smaller cities which took advantage of the old rule for taking a person ill and dangerous to the court. We did that in the case of an unfortunate individual who had three or four children living in squalid circumstances and the court sent this man to what was then a part of our tuberculosis hospital, a series of shacks. After this man had been there for a certain period of time his friends got knowledge of it and through habeas corpus proceedings they took his case up to the superior court. The judge would not give any decision on it but simply remanded this man to the custody of the local board. Now if there were a law in Massachusetts to protect boards of health, a justice of the higher court could have passed on the law and could have passed on that case and not simply remanded the man to the custody of the local board.

Dr. Elliott Washburn, Superintendent Rutland State Sanatorium, Rutland, Mass.: Last week at the New England Conference on Tuberculosis at Bangor I heard Mr. Chester Bryant, agent of the board of health of Haverhill, give an admirable address upon the subject of the "incorrigible consumptive" which I hope will be printed so that every member of this association may see it. Two years ago it was my fortune to be a member of a committee of the state inspectors of health of Massachusetts whose especial duty it was to gather and present to the State Board of Health data which that board might use in formulating, together with the trustees of hospitals for consumptives, a state policy in tuberculosis. Wherever this committee went, and its investigations were carried on in every part of the Commonwealth, we found on the part of health authorities, persons interested in the tuberculosis problem, social workers and many other citizens a strong, in instances almost compelling, demand for a definite, specific law which should control the incorrigible, unteachable and careless consumptive. Although there is existing law which some city and town counsels consider sufficient to meet the existing situation yet the word "tuberculosis" is not specifically written into the law and we find certain other legal authorities in other cities and towns who advise their boards of health to keep their hands off such cases. So in Haverhill the city solicitor instructed the

board of health that they had sufficient authority under the law while, on the other hand, in the adjoining city of Lawrence the city solicitor told the board of health of that city that it had no such authority. With these divergent interpretations of the law naturally boards of health are timid in their action. I believe we need a definite, specific law whereby, when necessary, this class of dangerous consumptives may be compulsorily isolated. Without such a law much of the effort of the Commonwealth in the tuberculosis problem comes to naught.

Mr. Borden, of Fall River Board of Health: In regard to the provisions of the law, I think it is essential that the court should enforce it because our constitution requires certain safeguards upon the part of the state. I am afraid that no commission could incarcerate a person without amending our constitution. In regard to the methods of taking care of the incorrigible, it seems to me we ought to begin with a series of provisions. In the first place, we ought to have in every place a hospital where we can hold forth to the patient every possible facility for cure if cure is possible, not to consider that they are incorrigible because they feel something should be done for them at our hospitals and are not satisfied with the results. Then we ought to have a hospital which ought to be a house of detention—it ought not to be a penal hospital, it ought not to be an insane asylum, it should be a state institution, it should be named a hospital for incorrigible consumptives, or some such name as that, so that a patient who went there had to remain there under supervision until it became apparent he could go to another hospital and behave and would not be under the coercion they receive there. In other words, a willing patient ought not to be made to go to a hospital where unwilling patients are compelled to reside. There are different types of incorrigibles; some of evil habits, some indisposed to treatment; they ought not to be made associates with people who are willing and desirous to do what they can for a cure. Now we have not yet begun to get the facilities we need for the care of this disease in this state, and I hope that as soon as the legislature permits proper laws will be made, proper tools will be provided and then the boards of health will act freely. You cannot expect a board of health to meet with the approval of the citizens in its locality which incarcerates persons who are guilty of no crime except being sick of a disease which they do not appreciate, and still does not make every provision for curative methods.

QUESTION 4.

What are the best methods for the control of markets, restaurants and bakeries? Is the use of a score card practical? Discussion opened by Dr. Alexander Burr of Boston.

Dr. Burr: Mr. Chairman, In answer—and I will take a very short time—it seems to me that if the unclean stores, unclean persons and unclean methods are of any importance in health rule, there is just one thing to do and that is to license these different stores. I do not know any other way you can control them but by licensing them, following that by proper and repeated examinations of the stores and then have power to revoke the licenses if not satisfactory. In regard to the second question, the practicability of score cards, I suppose that refers to score cards for stores. These are not much used at present. I think the score card is practical in places outside of your borders where you fix a standard for such places as dairies. I do not think it is as satisfactory to use a score card within the borders of your city as it is to use a report card which goes

into detail. The score card does not state the actual defects, it gives you the percentage for the conditions found, whereas the report card goes into detail and can be followed up quickly. I do not think it is as practical to use a score card as it is to use a report card going into the details.

Mr. R. N. Hoyt, Coöperative Boards of Health, Wellesley, Mass.: I am very much interested in this question because it is something which I have taken up recently. We have a system of scoring all places where food is sold, and we score them because we wish to use publicity in order to secure improvement. If you tell a man you are going to publish his score in the paper, after you have given him a chance to improve—that is to say, publish his second score, not his first—you give him the greatest possible inducement for improvement. That is the method we are adopting. I would be glad to know if any others are using that method. I would like to say something about one statement which was made in regard to publicity of milk analyses. The statement was made that they cannot be understood by the general public. I do not think that statement will be made by anyone who has tried to teach the public to interpret milk analyses. We have tried it, and we find that they do understand. They say to the milkman, "Your analyses have not been good. Why is it?" The result is that the milkman comes to the inspector to find out how he can improve and get a good record. With publicity, the milkman or marketman, as the case may be, comes to you. The recommendations you make at their solicitation are taken in a very different way, than if you went out to the marketman or milkman and tried to show them how to conduct their business, forcing yourself upon them. In the former case, you come as a friend, and you make it financially worth their while to conduct their business not up to the bare minimum of excellence which you can enforce by law, but up to the maximum of their ability.

Dr. Croston, of Haverhill: I will say that the city of Haverhill for the past two years has been scoring its markets, bakeries and all places where food is sold, reporting the cards in the papers, improving the markets and creating a little more trouble for the board of health.

Mr. Howe, of Board of Health of Framingham, Mass.: I would like to say in answer to the next to the last speaker that we held a hearing in Framingham to find out the attitude of the marketmen and grocery men, and the representative of the largest market said that he was very glad we were going to do so, not only for the health of the community, but because he thought it would stimulate his employees in keeping up the stores better than they would otherwise. He said as a proprietor he wanted things right, but as every practical man knew, sometimes conditions were not as they would like to have them, and by having an inspection from outside to keep them up to standard it would be a help to the employees and to himself.

Dr. Maloney, of Fall River Board of Health: I think I agree with Dr. Burr that the detail report card rather than the score card is the best for market inspection system. We have had market inspection in our city for four years. We have tried various sorts of schemes and the detail report card seems to us more effective in the cleaning up the stores than the score card such as is used in dairy work. It does not seem to be so practical, as Dr. Burr has explained, as the detail report of conditions. Those conditions explain fully to the men, and most men for sanitary reasons clean up. In our experience we have derived a good deal of benefit from the report card. I would like to answer the gentleman who said that any person who made the statement that publicity of milk analyses cannot be understood by the general public had no experience along that line. I have had charge of the milk inspection in Fall River, a city of 125,000, for eight years and we think we have had some experience. We have tried that thing out very carefully and found it impractical. As a matter of village gossip in a place like Wellesley and some other such places publicity might be acceptable.

QUESTION 5.

Are boards of health in different cities and towns supposed to furnish silver nitrate solution to midwives? Discussion opened by Dr. W. P. Bowers, Clinton, Mass.

Dr. Bowers: I am asked to discuss the following question: "Are boards of health in different cities and towns supposed to furnish silver nitrate solution to midwives?"

This question implies either that boards of health do furnish nitrate of silver solution to midwives or that requests have been made for the distribution of this remedy, and if so, it may be assumed that someone wishes to know whether or not boards of health should, either as a matter of good policy or as a definite duty, furnish this solution to midwives. In other words, is this distribution of nitrate of silver solution to midwives a function of a board of health?

A consideration of this subject involves a study of the law. Sections 49 and 50 of the revised laws require the nurse, relative, or *other attendant* having in charge an infant with inflamed, swollen, or red eyes, or where there is an unnatural discharge from the eyes within two weeks after birth, to report the condition to the board of health. A penalty is provided for non-compliance with this law.

Chapter 458 of the Acts of 1910 provides that the State Board of Health is given authority to distribute gratuitously to all *registered physicians* an outfit for the prophylactic treatment of infants at birth. No authority is, however, given to distribute this outfit to any other person. In order to facilitate the prompt use of this valuable prophylactic agent, the State Board of Health has established depots for its distribution.

Lying-in hospitals are licensed by the State Board of Charity and in the law providing for this function, authority is also given to make regulations governing the work of such hospitals.

Regulation No. 8 reads: "Each licensee shall be responsible for the use at every birth for the prevention of ophthalmia neonatorum, of either the one per cent. solution of nitrate of silver furnished to physicians by the State Board of Health, or some similar preparation having the approval of the said board."

If midwives conducted lying-in hospitals it might be inferred that authority had been given them to use nitrate of silver solution, but I have been unable to find any midwife licensed to conduct such institutions.

The practice of the midwife has been defined by the Massachusetts Supreme Court to be the practice of medicine, and any person practising medicine without having been registered by the State Board of Registration in Medicine is performing an illegal act, hence it can be logically

claimed that when a board of health furnishes to a midwife the solution of nitrate of silver distributed for the use of physicians only, and the use of which constitutes the practice of medicine, then that board is aiding and abetting a criminal practice. A board of health is a legally constituted body and no legally constituted body, nor any other body or person can properly aid and abet a criminal practice. Therefore, logically, boards of health cannot be supposed to furnish nitrate of silver solution to midwives.

It must be confessed, however, that a superficial study of the situation seems to show an embarrassing complication, for Section 1 of Chapter 280 of the Acts of 1912 states that physicians and midwives shall within forty-eight hours after the birth of every child in cases of which they were in charge, mail or deliver to the clerk or registrar of the city or town in which the birth occurred a notice, etc., and again in Section 2 of the same chapter, it is provided that physicians and midwives *shall* make and keep a record of the birth of every child in cases of which they were in charge, and again later in the same section the fee of the physician or midwife who performs this work is specified. Still later in this section a penalty is provided for not complying with this act.

Massachusetts therefore provides under her medical practice act that midwives cannot practise, but pays her twenty-five cents every time she certifies that she has broken the law and then fines her, one hundred dollars in some instances, because she took the bait of a quarter of a dollar. If ever there was a law devised for ensnaring the ignorant, it certainly exists in this chapter.

But it has been decided by the courts that this chapter does not interfere with the medical registration law nor modify it in any way and did not contemplate legalizing the work of the midwife, but simply provides that since the reporting of births is essential, it must be done by the one in attendance who may be acting in an emergency and without pay, just as in Section 49 of Chapter 75, a householder who knows that a person in his family or house is sick of an infectious or contagious case must report the fact to the board of health.

No one has yet claimed that the mention of the householder and the placing of this responsibility upon him confers the right to care for the case of infectious or contagious disease as a physician, or to do anything more than to simply report the same.

The only justification for this Section 1 of Chapter 280 of the Acts of 1912 is the effort of officials having the responsibility for vital statistics to secure prompt and accurate returns of births.

Sooner or later the question of whether the end justifies the means must be answered. Or to put it plainly, can we imperil the lives and health of women and children by adherence to a plan which only secures better birth returns?

Some students of the problem will contend that the midwife should be licensed because she is here as a part of the scheme of the domestic life of our foreign population, and further, that her work is less hazardous to her patients than that of the physician.

We know that the practice of the midwife is unclean, inefficient and dangerous, and if doctors do not do better work than the midwives, let us start a campaign against inefficient doctors and improve our faulty medical registration act.

We have a responsibility for our foreign population for they are here by our implied invitation. We must elevate them to our standards. If we cannot recognize their adherence to the custom of employing the midwife, we must provide a substitute which is better, or else we will be compelled to recognize and register the midwife.

But that is another story: ethical, sociological, and professional, too deep and complicated for a short discussion.

It may be interesting to know a few general facts:

According to reports of boards of health of 69 cities and towns of over five thousand inhabitants of Massachusetts, there are four hundred and sixty-four known midwives, with several more suspected.

Boards of Health of Pittsfield, Fall River, Springfield, North Adams, Gloucester, Lowell, Brockton, Cambridge, Fitchburg and Chelsea are supplying nitrate of silver solution to midwives. Pittsfield reports that this was done at the *request* of the State Board of Health.

Then ten cities are supplying one hundred and four midwives with a remedy which, in my opinion, they are incompetent to use. If used at all, it should be used by a nurse or physician who is trained to apply it. Those who understand the care of cases of ophthalmia neonatorum insist that it not only requires the service of a nurse, but of a nurse especially trained to properly apply a remedy to the eyes of an infant. How many of you who practise obstetrics and use the nitrate of silver solution would be ready to testify that a midwife unaided could or would apply the nitrate of silver solution safely and effectively? If you are ready to so testify, you have a knowledge of a better class of midwives than those who have come under my observation.

Among the letters received I wish to read three which are representative to a certain extent of the answers which have been sent to requests for information:

GENTLEMEN:

Your letter of Oct. 21 at hand in answer to you would reply we have not got any midwives practising in our town, and the Board of health have not got any nitrate of silver solution.

The Board of Health of ——— have never had any antipestilential from the state that I know of, and any thing that the state would furnish for the Doctors free I would be pleased to have you send me that would be of use to the Town and I will hand same to the Doctors in the Town thanking you in advance I remain

GENTLEMEN:

Replying to yours of the 21st in regard to midwives:

Naturally we do not encourage an illegal practise by furnishing nitrate of silver or anything else. On the other hand we have successfully prosecuted recently the only case we have been able to discover in the city (fined \$100.00 illegal practise and \$10.00 failure to report birth). One or two others we have caused to stop the practise without court prosecutions because of insufficient evidence and also that the persons were willing to comply with the law after they understood it.

We furnish nitrate of silver to doctors only who, as far as we know, are the only ones in charge of childbirth cases in this city.

DEAR SIR:

Answering your letter of the 21st instant, I beg leave to advise you that we have, at least, two women who practice midwifery in ——, and their practice is confined entirely to Poles and Italians.

Not very long after you were good enough to send me copies of the decision of the Supreme Judicial Court, I send word to these two women through the police department to discontinue the practice of obstetrics. I remember that when I told our official city registrar that it was my intention to do this he, in a way, demurred, and said that the returns of births made by these two women were more complete and satisfactory than any returns that are filed in his office by physicians.

I almost regret that I notified them to discontinue because since that time I understand that neither of these two women have made any returns of births to the registrar. Failure to make these returns, of course, will indicate an apparent increase in the proportion of deaths to births, which I do not like.

I have reason to believe that these two women still practice their profession in our city, because our visiting nurse, every once in a while, runs across a new-born baby in a Polish or Italian family; but it is absolutely impossible to get a word of information in regard to the person who attended the mother professionally. All that they will say is "neighbor help."

We have never furnished any nitrate of silver solution to midwives, for the reason that no midwife has applied for it, and no person other than a physician has ever applied for the nitrate of silver solution.

If either of these midwives have ever had a case of ophthalmia neonatorum or any other affection of the eye of the newly-born, they have never made any report of it to this office.

To recapitulate:

The midwife has no standing in law. If she is not registered as a physician, and practises midwifery or applies nitrate of silver solution to the eyes of an infant, she is practising medicine illegally and is a proper subject for prosecution.

There is no provision in law permitting the State Board of Health to distribute nitrate of silver solution to any person other than a physician. If a board of health supplies a midwife with nitrate of silver solution, this board is encouraging and aiding an illegal practice.

Therefore boards of health are not supposed to furnish nitrate of silver solution to midwives.

A Member: Mr. President, I would like to know if Dr. Bowers considers the preventing of disease as the practice of medicine. Does a woman, when she takes a baby from a house to prevent it from being infected, practise medicine? Is the fact that she is putting nitrate of silver solution into the eye the treatment of a disease which exists, or is it merely the prevention of disease?

Dr. Bowers: The practice of medicine is just as much to prevent as it is to cure disease. Prevention is just as much the practice of medicine as treating the patient after he is sick. If the gentleman will study the dictionary definition of the practice of medicine he will become satisfied as to the attitude we ought to take as to this subject.

Mr. Henry Copley Greene: I think I am warranted in saying that the Commission for the Blind has recognized that there have been a number of midwives commonly practising, for whom the judges would not even issue a warrant. We have urged these midwives to go to the boards of health, and report cases of ophthalmia neonatorum. In certain instances the boards of health have carefully picked out the best midwives, and shown them how to use the prophylactic. They went on doing that as a duty, sometimes as a nurse would under a doctor's direction, more often not. Since then we have found fewer cases of infant blindness in the practice of midwives. Now, I do not believe in having midwives, if we can help it. But while they are here, and as long as they are permitted to practise, it seems to me better to let them have the prophylactic, as a preventive measure, rather than to have blind babies who grow up to blind adults at a cost, not only of suffering to themselves but of great sums of money to the state.

QUESTION 6.

Why do some physicians decline to report tuberculosis when they know the law requires them to report all such cases (Acts 1907, ch. 480)?
Discussion opened by Dr. T. B. Shea of Boston.

Dr. Shea: Mr. Chairman, one of the great reasons, and probably the principal reason, that cases of tuberculosis are not reported as the law demands is that unfortunately the person afflicted with this disease falls into the hands of some practitioner who has not even grasped the modern treatment of this disease. The interests of the patient demand that the case should be reported promptly. If we consider today the resources of the health department that can be furnished, not only to the patients, but to the physicians, it is beyond understanding why some physicians will fail to report, not only tuberculosis, but also other diseases which are dangerous to the public health. Once the case is reported, the patient is immediately placed under good sanitary conditions, not only at home, but also at his place of employment; there is a corps of medical inspectors and visiting nurses who are willing to give aid and counsel to the physician. The physician has the use of a number of laboratories connected with the health department; hospital accommodations are furnished if the case is such as requires hospital treatment. Then, again, by having his case reported to the department the patient is compelled to comply with the regulations made for his care, and is prevented from reinfecting himself and other members of his family or the community. Then, again, as regards the physician, a great responsibility is removed from the physician's shoulders once the case is reported to the health department. The health department under the law is obliged to take all necessary measures to control and to prevent the spread of the disease. So, if the interest of the patient or of the physician is considered it is beyond understanding why

they are not reported. One unreported case would probably do more damage than one hundred reported cases. Now, as regards the situation in Boston, I can speak, probably, officially. We have about 3,000—between 3,000 and 3,500 reports annually. Of those cases in the past few years over one hundred were found not to have been reported. The majority of those cases were medical examiner cases and medical inspector cases where the diagnosis was made *post-mortem*; many cases were found also on autopsy. Now this condition in Boston may be accounted for by the policy pursued by my board the last few years. After several notices to the profession that not only tuberculosis but also other diseases that have been declared dangerous to public health must be duly reported to comply with the law, several physicians were summoned into court; and as the minimum fine in those cases is not less than fifty dollars, the cases as a result have been reported promptly. These cases also were given wide publicity through the public press and the different medical journals, and the condition in Boston is all that could be desired as regards the registration of these cases. However, since this question was proposed for discussion I have looked up some of the mortality reports in this state and it is surprising to see in some cities and towns that the deaths outnumber the cases reported in these communities. Now, such a condition of affairs is not just to the citizens in this commonwealth. They have their health departments, elected for the protection of the public health, and to allow the cases of death in a year to exceed those reported shows no healthy condition of affairs in that community. Now, although it is late, I would like to say a word on the question of forcible removal which will possibly be of some advantage to the other members of this association. We have been making forcible removals in Boston, not only of cases of tuberculosis but also of smallpox, scarlet fever, in fact any disease that is dangerous to public health. It is a daily occurrence. For the last fifteen years we have been removing those cases to the hospital whenever they became a menace to the family or to the neighborhood. Some cases have been tested in court. One case was tried and the verdict was in favor of the health department. Another case of habeas corpus was tried in the supreme court for the release of a man confined in the scarlet fever hospital. We find in Boston the courts are sustaining us in all measures we have taken as regards the protection of the health of the community.

QUESTION 7.

Why is it that so few towns of 10,000 inhabitants or over have complied with the law requiring them to maintain a tuberculosis dispensary (Acts 1911, ch. 576—Acts 1914, ch. 408)? Discussion opened by S. H. Stone, Boston.

Mr. Stone: The report of the Special Recess Committee on Tuberculosis which sat during the summer of 1913 states: "This Committee believes that it is imperatively necessary that the dispensary law should be more generally complied with and in order to obviate confusion, the State Board of Health should be given power to define the dispensary and establish a standard for it. The dispensary is an indispensable link in the system of home treatment of the disease, where not only medicine and other material relief but teaching as to general hygiene and sanitation may be obtained."

The law (Acts 1914, Chapter 408) which requires cities and towns of 10,000 inhabitants and over to establish tuberculosis dispensaries is as follows:

"Every city and town containing a population of ten thousand or more, as determined by the latest United States census, shall establish and maintain within its limits a dispensary for the discovery, treatment, and supervision of needy persons resident within its limits and afflicted with tuberculosis, unless there already exists in such city or town a dispensary which is satisfactory to the State Board of Health. The said dispensaries shall be subject to the regulations of the boards of health of the cities or towns in which they are respectively situated, and shall be inspected by, and be satisfactory to, the State Board of Health. A city or town subject to the provisions of this act which, upon the request of the State Board of Health, refuses or neglects to comply with the provisions hereof, shall forfeit not more than five hundred dollars for every such refusal or neglect."

There are 54 cities and towns of 10,000 inhabitants or over in the state of Massachusetts. While I have no absolutely accurate figures as to the number of tuberculosis dispensaries in the state, so far as I can find out there are not more than 13 that can in any way be called *municipal* dispensaries, and it is doubtful if all of these would meet with the approval of the State Board of Health.

About five or six are run on the coöperative basis between private agencies, tuberculosis associations, district nursing associations, and hospitals and the board of health.

In addition to these 13 there are about seven run entirely by anti-tuberculosis associations.

I do not believe that it is necessary for anyone to point out to this

gathering the great value of the dispensary in the fight against tuberculosis, especially if such a dispensary has one or two visiting nurses attached to it.

It seems to me, Mr. President, that it would be interesting to know why this law is not being complied with; and, if it is an undesirable law, to know just what the objections are.

Dr. L. A. Jones, of North Adams: Mr. President, I have a communication bearing on this subject, from Dr. Hanson, acting Commissioner of Health, which I will read:

October 29, 1914.

TO THE MEMBERS OF THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH:

On the program for today's meeting question 7 is:

"Why is it that so few towns of 10,000 inhabitants or over have complied with the law requiring them to maintain a tuberculosis dispensary?"

If one reads the dispensary act carefully (Chapter 408, Acts of 1914) he will see that such dispensaries as are referred to shall be established "*unless* there already exists in such city or town a dispensary which is satisfactory to the State Board of Health." From a practical viewpoint this proviso in the dispensary law means two things. In the first place, the law fails to define the meaning of the word "dispensary" and many communities fail to establish institutions which measure up to modern requirements. In the second place, were some minimum requirements set by the State Department of Health for a standard for all dispensaries, it would still be necessary to consider most carefully the needs of individual communities.

The first difficulty in the enforcement of the law was pointed out by the joint board of the State Board of Health and the Trustees of Hospitals for Consumptives in their report to the Legislature in 1912 (House Document No. 1950). In 1914 the dispensary law was amended, but the amendment did not include a definition of dispensary. It only stated words to the effect that when dispensaries are established they "shall be inspected by and be satisfactory to the State Board of Health." In other words, the dispensary law is as difficult of enforcement as it was originally.

It would appear to me desirable for the Association to consider whether a committee of their number, appointed by the President to represent the various local interests, might not be a distinct help to the State Department of Health in the enforcement of the dispensary law.

WM. C. HANSON,
Acting Commissioner of Health.

I beg to add a few words as to why tuberculosis dispensaries have not been established in some of the smaller cities and towns.

One reason is that in these places there are few dispensaries of any sort now to be found, and the people have not yet acquired the dispensary habit, or the idea of going to such places because there has been no opportunity. For example, in Pittsfield, a city of 35,000 inhabitants, for two years one of the hospitals has maintained an out-patient department, and the total number of persons visiting it during the two years has been about 600. Of these over 60 per cent. have been discharged hospital patients who returned for dressings. Of the remainder the majority have been minor surgical cases, and the medical cases very few. The total of tuberculosis cases has scarcely exceeded an average of one a month, and these were mostly brought by the visiting nurse or others.

The majority of the people seek their family physician, who undertakes their care without reference to whether they are able to pay or not.

Another reason is that in some places, people who might otherwise seek a dispensary depend upon the lodge physician or society doctor. To illustrate: In North Adams, with a population of 22,000, it is conservative to say that there are 8,000 people approximately, who receive medical care from society physicians. These physicians receive one dollar per member per year for their services. In two societies, with an aggregate membership of about 1,200, the physician receives two dollars per member, and attends in addition the member's household as well. Such people would not be apt to seek a dispensary.

Another practical difficulty in the way of establishing tuberculosis dispensaries is that there is often a lack of professional harmony; and that were a competent man—if indeed such could always be found—appointed to dispensary service, such a man would not always receive the assistance and backing of the other physicians which a successful dispensary would require.

A tuberculosis dispensary would require, always, but especially in its beginning, a nurse

trained in tuberculosis work. But where the public sentiment of a community will not justify the employment of a nurse for school or other health work, it will be difficult to secure a nurse for this work.

For these and other reasons the problem is not simple. The whole thing comes back to the education of the public to the advantages of such dispensaries. Because, unless you have the backing of the public, it would be difficult to carry out the law where such knowledge is unappreciated.

MEMBERS OF THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

NOVEMBER, 1914.

- Dr. William H. Allen, 70 No. Main St., Mansfield, Mass.
Dr. Burdette L. Arms, Medical University of Texas, Galveston, Texas.
A. A. Arthur, Board of Health, Marshfield, Mass.
Dr. Silas H. Ayer, 318 Shawmut Ave., Boston, Mass.
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HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS.

Louisiana.

The most noteworthy feature of the biennial report of the State Board of Health of Louisiana, under the presidency of Dr. Oscar Dowling, for 1912-1913, is the account of the activities directed toward securing more effective health organization throughout the state. To determine the status as to local health organization and service an inclusive questionnaire was sent to each mayor, health officer, and president of police jury throughout the state. In view of the present movement toward reorganization of the sanitary systems of whole states, results and the conclusions reached in Louisiana are well worth quoting at some length:

"There are in the state 195 incorporated communities. Of these 156 sent replies to questionnaire. The records show 104 communities having duly qualified health boards. In 73 of these no salary is attached. Where there is compensation, the amounts are from \$50 to \$720 annually, average \$191 a year. In 37 there are appropriations; these range from \$50 to \$2,500. Omitting Alexandria and Lafayette (Shreveport, Baton Rouge and Monroe reports were not received), which appropriate each \$2,500, the average annual appropriation is \$310. In 10 communities there are additional revenues, fines, etc. Only 38 have sanitary inspection. New Orleans is the only city in the state which employs a whole-time health officer. . . .

"The consequence (using the above) is, in 46 per cent. of incorporated communities, no systematic work is done, no accurate records are kept, no reports are made to the State Department, hence with few exceptions, there is no sanitary protection nor sanitary progress.

"The public is not convinced of the value of excellence in service; and capable men, unless actuated by altruistic motives, will not

accept office. The solution of the problem lies in the education of the public to the economic and personal advantage of practical application of the science of health. This implies slow progress in sanitary development with the inevitable consequences—for some, a short term of life; for others, suffering and low wage-earning power; and for the community, a continuation of social evils which could be controlled or eradicated.

"Experience shows that local health administration is more efficient when under regular supervision and some direct control by a central authority of the state.

"In Louisiana the inefficiency of the present cumbersome system, with division of responsibility, is proof."

The solution proposed is similar to that recently adopted in New York State: division of the state into districts, each to be supervised by a whole-time health officer, with one assistant, appointment and tenure of office to depend on qualifications and efficiency; local boards in specific lines of administration, to be made directly responsible to the State Board of Health; mandatory employment of whole-time health officers by communities of 10,000 or over; attendance of all officers for five days at annual health conference, expenses to be paid by jurisdiction represented. Such health officers would be required to be qualified, the minimum salary to be \$1200. The present overlapping powers of local officers would be eliminated and responsibility fixed. Such supervisory officers would make investigations and recommendations and would secure the enforcement of the State Sanitary code.

A sanitary survey of the state was also undertaken in order that accurate information as to conditions in every community might be available for comparison and more intelligent direction. Two hundred and

forty-five communities were fully investigated with a total of 13,647 inspections, the work being carried on in connection with the "health cars." Reports and recommendations were rendered to the local authorities and in some instances published. This valuable work is very fully reported upon in comparative tables.

An especially interesting portion of the report deals with the "health cars" which have proved highly valuable in popular educational work. The State Board of Health owns two such cars, fitted up with exhibits, equipment for office work, etc., which, through the courtesy of the railroads, are taken throughout the state. In their second itinerary these cars visited 135 communities and the exhibits attended by nearly 100,000 people; besides which some trips were made on special request outside of the State. Several excellent photographs illustrate the report of this work, which represents, in its

efficacy in reaching all classes of communities, the most advanced phase of health exhibition work.

The State Registrar reports that efforts are being made to make good the very serious deficiencies now existing in the registration of vital statistics. An entirely new system, which has been put in operation, permits the appointment of postmasters as registrars, with particular reference to the needs of remote communities.

The customary division reports are included. In that of the Analyst the inclusion of a table of food and drug analyses by kind and place would seem to be superfluous. It should be noted that many page numbers are dropped where charts are inserted, making the page references somewhat confusing.

Altogether this report is a clear and adequate exposition of progressive state health work.

Florida.

Another state in which steps have been taken to organize the public health service on a district basis is Florida, the annual report of whose State Board of Health (the State Health Officer being Dr. Joseph Y. Porter) for 1913, has come to hand. The state has been divided into seven districts, each of which is under the supervision of an appointee known as an Assistant to the State Health Officer. These assistants make three regular tours of inspection over their respective districts yearly, submitting a report of each trip to the State Health Officer. They also respond to special calls for investigation, advice, etc., and submit an annual report. The supervision exercised by the state authorities through these agents appears to be simply advisory. A considerable portion of the volume is devoted to their reports.

Effective work in publicity, through the monthly bulletin (*Health Notes*), an extensive press service, and special publications, is reported.

Under the head of communicable disease, the free distribution to indigents of diphtheria

and tetanus antitoxin through the druggists is mentioned. A diphtheria epidemic of 59 cases occurred, but the source was not clearly located.

Malaria is reported to be on the decrease, presumably as a result of greater use of screening rather than the radical measure of mosquito reduction.

In the discussion on typhoid fever reference is made to the importance of anti-fly regulations, such as those designed to prevent fly breeding in and around stables, to fly-proof surface closets, to screen restaurants, etc., and the like; which, however, are by no means universal through the state. Typhoid fever was added to the list of reportable diseases, and a number of free anti-typhoid vaccinations were made in various communities with vaccine supplied by the State Board. The lower amount of typhoid fever in Tampa is ascribed to greater attention having been paid to the fly question and to surface drainage.

In the discussion on tuberculosis it is rather surprising to find the value of state sanatoria set aside. On the other hand the

employment of public health nurses for this disease is recommended.

Of the hookworm specimens examined during the year 35 per cent. were positive.

The reduction of rabies through muzzling ordinances and destruction of all homeless stray dogs is urged. One hundred and seven persons received Pasteur treatment through the state, and there were six deaths from rabies. Much live stock was also destroyed on this account, the disease being found in a fox, squirrel, chicken, horses, cows, and cats, in addition to dogs and human beings.

A chart showing the recurrence of "small-pox tides" is given.

For convenience' sake the Board maintains three diagnostic laboratories in different parts of the state.

An investigation among the Seminole Indians, with special reference to hookworm, is interestingly reported. Orthopædic work on 25 patients under the "Crippled Children Act" is covered in a well-illustrated report.

"It is a deplorable fact," in the words of the State Health Officer, "that Florida has not a system of vital statistics which can be made useful in obtaining definite knowledge of the life movement of her people, or which can be used to benefit the state commercially."

While progress has been made in obtaining local coöperation, uniform laws are needed, which could be strictly enforced under the administration of the State Registrar or Health Officer, in spite of the unfortunate statement that "it is repugnant to the State Health Officer to hale any of his professional brethren before a court of law for a failure to fulfill what should be a civic duty." A similar comment applies to morbidity reports.

As subsidiary statistical data a number of tables and charts are given: A table of diagnostic tests by disease, month, and place appears superfluous, as well as a table of distribution of vaccine points by place and month.

Rochester, New York.

Differing markedly from the report of the ordinary health officer is that of Dr. George W. Goler, Health Officer of Rochester, for the year of 1913. Instead of confining himself to a mere routine statement of death-rates, cases of disease, laboratory examinations and improvements introduced, Dr. Goler takes each of the important facts which his work has brought to his attention and uses it as the text for an educational dissertation on causes and remedies. No one is more conscious of the defects in the line of defence against disease than he, and certainly no one could show less hesitation in facing the facts and bringing them to the attention of the public.

Such a report is extremely difficult to review because so many of his monographs are worthy of reprinting in full and would be of great value to other health officers as well as to the citizens of Rochester for whom they were intended. Paraphrased, they lose their force and value but we may briefly mention the following subjects which are of especial interest.

In the discussion of births and the birth-rate he tells plainly of the inefficiency of the birth reporting system. In no uncertain terms he denounces the members of reputable medical societies, some of whom shiftlessly let the reporting of births slide and others who connive to thwart the law by signing birth certificates where the accoucheur was an unlicensed midwife. With a birth-rate of 25.55 he finds that 7.3 per cent. of the infant deaths were of children whose births had not been registered. The unlicensed midwife carries on her trade more or less openly in spite of ample law, and when cases have been brought against her before the police court or grand jury as a result of the death of the mother in her care because of ignorance or neglect, no conviction can be secured and the case only serves to give her advertising as a cheap and illegal midwife. The need of replacing the midwife by the trained obstetrician and obstetrical nurse is emphasized in order that all mothers may receive good pre-natal and post-natal care since three-fifths of the women married have no training for motherhood.

Under the head of infectious diseases, child welfare, and elsewhere, the importance of venereal disease is pointed out, showing its true significance as a cause of death and how the lack of health requirements for marriage and of education of the children to an appreciation of the true conditions is a menace to the welfare of the race. The fact that Dr. Goler is very conservative in his statements and figures does not detract from their force.

Other valuable discussions include the causes of death, the importance of the infectious diseases of childhood, the control of cancer, the care of the teeth, child welfare, and child labor. It is reported that one of the great effects of the use of the milk sediment tester has been to cause the use of absorbent cotton as a filter by the dealers, a condition which is also noted in other cities. While this filtering is in a way desirable it is rather superficial and may of course be a

source of grave error by the laboratory which does not check sediment tests by means of bacterial counts.

That the work of the department is efficient and not limited to a mere decrying of bad conditions is shown by the death-rate of 14.69 with a population estimated at 235,000 and an infant mortality rate of only 97 per thousand births, notwithstanding incomplete birth reports. In addition to Dr. Goler's general report there are detailed reports by other members of the staff, including the milk inspector, plumbing inspector, medical school inspector, school nurses, chemist, and bacteriologist and hospital superintendent. Unusually complete tabulated and other statistical reports are given as well as a complete financial report. While the alphabetical arrangement of causes of death is better than most of its type it is unfortunate that the International System should not be adopted.

Palo Alto, California.

The report of the health department of the city of Palo Alto for the year ending June 30, 1914, is included in the city report for that time and is interesting as showing what a small city can do when it is awake to the importance of the public health. Palo Alto is located twenty-eight miles south of San Francisco and has only 5,300 inhabitants within its corporate limits. Notwithstanding its relatively small size it spent \$2,543.00 on health work and apparently got a good return from its investment and is pleased with the result. The development of health work in the city has in a large measure been due to the efforts of Mr. H. O. Jenkins who resigned in January, 1914, after three years of most efficient service. His place has been filled by Mr. H. F. Gray of the University of California.

The condition of health in the city is shown by the death-rate of 5.8 per thousand population; 84 per cent. of the deaths being of persons over forty years old and the infant mortality rate being only 41.7. It is pointed out, however, that the birth-rate (9.1) is low owing to many of the city births

occurring in a hospital beyond the city limits and a similar factor may influence the death-rate although no mention is made of it.

The state law allowing children to avoid vaccination on the "conscientious objection" ground is said to have failed utterly; the per cent. of certificates of conscientious objection increasing in the past three years as follows: 20.4, 27.2, 37.4, while in one of the schools the "conscientious objections" include 58.4 per cent. of the children, a manifestly dangerous condition. The muzzling ordinance has been satisfactorily enforced and there have been no cases of rabies in either men or animals. An effort is being made to have cases of venereal disease reported (by office number only) and is meeting with some success. It is worthy of note that in three months of the year 1913-14 no cases of any contagious disease were reported.

The condition of the milk supply is especially praiseworthy. The standards have been gradually raised until now no milk may be sold from a dairy scoring less than 65, the minimum butter fat allowed is 3.4 per

cent. in market milk and 3.8 per cent. in inspected milk, the bacteria count on inspected milk may not be over 20,000 per cc., and with the exception of a single dairy the average bacterial count of the various producers did not exceed 50,000 per cc. Milk from cows not tuberculin-tested and passed must be pasteurized and the plentiful supply of

good raw milk has driven pasteurized milk from the market.

Other activities of the year have been the making of a complete sanitary survey of the city with a record and permanent index of conditions; the routine work of diagnosis; bacteriological, chemical and sediment tests on milk; and sanitary and dairy inspection.

DEPARTMENT NOTES.

County Health Organization.

A number of states, including Kentucky, Maryland, Georgia, and Kansas, have, according to Dr. Louis I. Dublin of the Metropolitan Life Insurance Company, either passed laws for county health service or are actively engaged in studying the question. Dr. Dublin's paper published in the *Journal of the American Medical Association* for November 14 reviews the need of effective administration for rural districts and advocates the development of efficient county health organizations as the solution of the problem. It is shown that in the twelve years from 1900 to 1912 the death-rate in the registration states decreased 21.2 per cent. in the cities but only 8.6 per cent. in the rural districts, yet it is in those districts that more than one-half of the people of the United States live. A questionnaire was sent to the executive health officers of all the states from the replies to which it is concluded "that full-time county health officers are an absolute necessity in most of our states; that very few such officers exist; that they are insufficiently paid; that responsibility to the centralized authority is lacking, and that county health work is only too often intimately connected with local politics. The present system of county health administration in the United States is inefficient and not conducive to the public welfare."

The principal requirements of an efficient county system are set forth as: (1) county organization to be an integral part of state health administrative system and responsible to it; (2) county health officers to be full-time, properly qualified and adequately paid officials; (3) tenure of office to be continuous with efficient service.

This paper is of importance in connection with the widespread interest now being taken in the problem of securing effective administration in the great class of the smaller communities and the rural districts throughout the states, the solution of which is to be looked for in plans of state district organization such as that put in operation not many months ago in New York State.

Medical Treatment of School Children in Rural Districts.

Two problems in the medical inspection of school children in rural districts are discussed by Dr. A. E. Williams in the October number of the *Journal of State Medicine*. One of these is the difficulty of visiting and follow-up work in isolated country schools; the other, and greater, is that of insuring the remedying of defects. "The parents, on the whole, are anxious and willing to do everything possible towards obtaining treatment for their children, but, owing to lack of facilities in the way of hospitals, etc., in the majority of cases they are able to do little or nothing."

"The chief aim of medical inspection should be the remedying of the defects found in the children and, if owing to financial reasons or want of facilities the parents are unable to secure the necessary treatment, it is then the duty of the education authority to make provision whereby the children may receive the attention required.

"The only satisfactory method of accomplishing this in rural districts is to provide a clinic on the lines of a 'Flying Clinic,' thus bringing the means of remedying the defects within the reach of all. Much has already been done in this direction, several authorities having established clinics of this de-

scription for the treatment of defective vision, ringworm, dental caries, etc.

"The experience gained up to the present is entirely in favor of the establishment of clinics, and it is now proved that 'flying' clinics are both practicable and useful. The cost is not great, and if the parents are able to contribute a small sum for the treatment received, very little of the expense need be borne by the authorities. The time is not far distant when these institutions will be looked upon as an essential part of every scheme of medical inspection."

A portable apparatus for an eye clinic in use in the author's district is outlined, and a brief account given of arrangements with visiting nurse associations for the treatment of ringworm, verminous conditions, etc. A 'flying' dental clinic is also mentioned.

New York Health Officers Confer.

The recent conference of the health officers of New York State is commented upon as follows by the State Charities Aid Association, which, it will be remembered, had a large part in the investigation which preceded the introduction of the new health law and in the campaign for its passage, and assisted in the work for the re-organization of the state health system:

"The annual conference of health officers, held in Saratoga, September 15 to 18, was the most enthusiastic and significant conference of sanitary officers ever held in this state. It was the first gathering of local officers since Dr. Hermann M. Biggs accepted the Commissionership and began the reorganization of the Department under the new public health law. There were registered seven hundred and fifty health officers, registrars of vital statistics, and members of boards of health.

"Governor Glynn's record in the building up of an efficient and non-partisan health department, under his administration, and his record on health legislation (except his veto of the rural hygiene bill) are highly commendable and form one of the greatest assets in his present campaign.

"The conference developed an enthusiasm for public health work that is a new thing in this state. This is largely due to the high

standard that Commissioner Biggs has maintained in all of his appointments. *Esprit de corps* is new in state health activity, but it was distinctly manifest at Saratoga, not only among the staff of the Department, but also among the local officers. Every one felt that a State Health Service is being built in which there is large opportunity for men and women who wish to devote themselves to public health work; a service in which one may be rewarded by successive promotions from the humblest place in the field to executive positions of large responsibility.

"The appointments in the Department have been made with fitness and ability the only factors considered; health work in this state is at last on a scientific basis."

Public Health Administration in Minnesota.

The report of the study of the State Board of Health of Minnesota by Carroll Fox, Surgeon, U. S. P. H. S. appears in the *Public Health Reports*, issue of October 2. It is an exceedingly complete and comprehensive report, worthy of careful study by those interested in public health administration.

Dr. Fox makes no less than twenty-four specific recommendations to the Board of which we quote a few as follows:

"The State is to be divided into twenty health districts each to be under the direct supervision of a physician trained in sanitary science. He is to hold his office during efficiency and good behavior and will be prohibited from engaging in any private business that would interfere with his official duties. He must prove himself capable of filling the position by examination or otherwise before appointment.

"That the number of employees in the division of sanitation be increased by at least five men, four of whom shall have received training in sanitary engineering and one of whom shall be an expert in analyses of water and sewage.

"That the state be divided into four districts in each of which shall be placed one of the men above mentioned as having received training in sanitary engineering, this field force to come under the supervision of the division of sanitation.

"That a law be enacted requiring the reporting of all marriages and divorces to the State Department of Health.

"That the prevention of occupational diseases and the maintenance of sanitation in places employing labor be placed under the control of the State Department of Health, and that legislation be enacted to give it all necessary power to act.

"That the work relative to school hygiene and child welfare, previously discontinued by the state on account of lack of funds, be resumed.

"That provision be made for the distribution of free antitoxin throughout the state where necessary.

"That a popular bulletin be issued monthly, and especially used for instructing children of the public schools.

"That all of the officials of the State Department of Health be made full-time men.

"That the method of keeping accounts be so changed that it will enable one to determine quickly and accurately the exact cost of any division or subdivision or piece of work at any time.

"That not less than \$270,000 be appropriated to the State Department of Health to be allotted by the State Board as may be necessary for the following purposes:

General.....	\$20,500
Preventable diseases.....	25,000
Special tuberculosis.....	17,000
Laboratory (relating to preventable disease).....	28,000
Pasteur Institute.....	10,000
Free antitoxin.....	10,000
Vital statistics.....	10,000
Child welfare and school hygiene...	10,000
Control of water and sewage.....	30,000
Industrial hygiene.....	10,000
District health organization.....	100,000
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	\$270,500

An Experiment in Local Health Administration.

The *Bulletin* of the Department of Health of New York City for October 10, contains a note on an experiment in local health administration. The plan calls for the establishment of a health district within which all the

functions of the health department are to be locally directed instead of from the Department headquarters, and in the control of field workers by a local director in place of the various bureau chiefs.

Headquarters will be provided large enough to include a milk station, and "social welfare" or district nurses.

Dr. Goldwater requests,

"Bureau Chiefs to keep in mind the general purpose of the proposed experiment, which is to try out the plan of local health administration; this plan aims at the avoidance of overlapping by different bureaus or departments concerned with health matters, and at increased usefulness through the establishment of intimate neighborly relations between the Department of Health and the local community. The plan outlined is tentative, and is subject to modification.

"The Department does not commit itself to the wider adoption of the plan, but wishes to study it in actual operation. The experiment will involve no extra expense to the city."

Boy Scouts Making a Survey of City.

A unique scheme of coöperation is being tried, apparently with success, in the city of Tacoma, according to the *Municipal Bulletin* of that city. The Boy Scouts are in charge of the work.

"Through an arrangement made by Health Officer Wall with Scout Commissioner F. J. Soule, practically every home in the city will be visited during the next few weeks and a report made to the city on the sanitary condition of the alley, the street, back and front yards and a host of other things.

"If conditions are reported bad by the scouts a regular sanitary inspector will look over the premises.

"Admittance need not be given the Scouts if the householders do not care for the inspection but all houses which refuse to admit the boys will be visited at once by a regular inspector. The city will go on the theory that only those places which have unsanitary conditions to cover up will refuse the Scouts admittance.

"A permanent record of the Scouts' reports will be kept. The city has furnished bound

books, one for each precinct in the city and one page for each house. On this page the Scout will be asked to report on the following: Name, address, condition of street; condition of alley, condition of front yard, condition of back yard, sewer connections, condition of cess-pool, if any, condition of outhouses, if any, water supply, condition of garbage cans, what domestic animals, number of tubercular cases, if any, injuries, if any, on last Fourth of July.

"The last bit of information asked for will give the first complete information about what havoc was wrought by fireworks on the nation's birthday. The rest of the information desired will give the health department an accurate working knowledge of the city's actual condition from a sanitary point of view. The places where sanitary precautions are lacking will be investigated by the regular inspectors. The work of the scouts will save the city many a dollar in labor as the pay-roll men will know exactly where to go to find the conditions that need remedying.

A warfare on the improper garbage receptacles and rubbish is one of the special objects of the survey. Likewise the department wants to know just how many cases of tuberculosis there are in the city. Heretofore, this, information has never been had."

Coöperation in Sanitation.

It has been well recognized that through the public schools a great deal may be done in popularizing sanitation and in securing coöperation. Dr. W. H. Marshall in *Michigan Health Bulletin* tells very interestingly his success in securing coöperation in this way.

"Realizing that the public schools were fruitful sources for the dissemination of disease," he says, "I sought, two years ago, to enlist the services of the teachers as sanitarians. At the beginning of the school year, a teachers' meeting is called and the principles of schoolroom hygiene and elementary medical inspection are discussed."

The subjects of ventilation, lighting, and the handling of books are dealt with in detail. Personal cleanliness is emphasized. The detection of eye-strain, adenoids, etc., is de-

scribed. A brief survey of the communicable diseases is given, particular stress being laid upon immediate action and reporting. Further civic pride is called upon to "clean-up" yards and vacant lots.

The literature of the State Board is freely and liberally circulated with the result that the children have become remarkably well informed on the fly and other pests dangerous to health.

The local lodges, clubs, especially the Women's and Mothers' Clubs, are appealed to with excellent results. The mothers are put on the mailing list of the State Board of Health publication.

Doctor Marshall is enthusiastic about his success in securing coöperation. He is firmly convinced that the coming generation is going to be cleaner and healthier than the present one, as a result of this teaching. The success of a health officer will be in proportion to his success in marshalling the available forces in his community.

Tenement House Law.

According to the weekly bulletin of the Cincinnati Board of Health for August 8, the Metropolitan Life Insurance Company has issued a circular on the tenement house law. This circular is quoted as follows:

Do YOU KNOW that the law provides for healthful conditions in tenement houses in Cincinnati? A tenement house is any house occupied by three or more families who live separately and do their own cooking on the premises. The term, therefore, covers apartment houses, which are not called tenement houses in common speech.

Do YOU KNOW that the law gives you the following rights?

Right I is that there shall be at least one sink with running water for every two families and not less than one sink on each floor.

Right II is that all common halls and stairways shall be lighted from sunset to 10 p. m. throughout the year. If the halls are dark during the day, windows must be provided or lights kept burning.

Right III is that the owner shall keep all parts of the house in good repair. He must keep all parts used by the tenants

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in common clean and free from rubbish, dirt, refuse, etc.

Right IV is that one toilet, a compartment for catch basin or privy vault, shall be furnished for every two families.

Right V is that no cellar of a tenement house not approved by the Board of Health shall be used for living purposes. A cellar is more than one-half below the ground level; a basement, not more than three feet, six inches below. Basements can be used if all rooms are at least seven and one-half feet in height, if they are well lighted and ventilated, and if the floors are well drained and the walls dry.

Do YOU KNOW that the law places certain duties upon you.

First—You must not overcrowd your rooms with members of your family or with lodgers?

Second—You must keep your own rooms clean and free from filth, refuse, etc., and must assist the owner in keeping the entire premises in a sanitary condition.

Third—You must not use any part of a tenement for the storage of feed, hay, rags, excelsior, or any highly inflammable material. The storage of paper stock upon tenement premises is prohibited.

If you are living in a tenement and are not obtaining everything you have a right to under the law, speak to your landlord at once. If unsanitary conditions and nuisances are not abated within a reasonable time, notify the Health Department at the City Hall. Structural defects should be referred to the Building Commissioner.

The law gives you the above rights. See that you get them.

Remember, however, that right and duty are correlative terms.

Sanitary Tax in Asheville, N. C.

The city of Asheville, N. C., has adopted a novel method of taxation to pay for sanitary improvements according to the *Bulletin* of the Health Department for September. Residences and boarding houses are to be assessed as follows:

ASSESSED VALUATION	ANNUAL ASSESSMENT
\$ 500.00 or less.....	\$.75
500.00 to \$1,000.00.....	1.00
1,000.00 to 1,500.00.....	1.25
1,500.00 to 2,000.00.....	1.50
2,000.00 to 2,500.00.....	1.75
2,500.00 to 3,000.00.....	2.00
3,000.00 to 5,000.00.....	2.50
5,000.00 and over.....	3.00

Boarding houses of over ten rooms:

10 to 20 rooms.....	\$4.00 annually
20 to 30 rooms.....	6.00 annually
30 to 40 rooms.....	8.00 annually

Hotels have been classified in six grades to be taxed from \$8.00 to \$24.00 annually. All business houses also are to be taxed according to a schedule.

The tax collector is to collect these taxes in the same manner as other taxes.

Hutchinson's All-Summer Fly Crusade.

The September issue of the *Bulletin* of the Kansas State Board of Health contains an interesting account of the All-Summer Fly Crusade. The report is by Doctor Lloyd A. Clay, president of the Hutchinson Board of Health.

The plan is a novel one and it worked very well indeed. Each Monday for the ten weeks between June 29 and August 31 prizes of \$2, and \$1, each, were awarded the boy or girl who brought the largest and next largest number of flies to the Board office. In addition the merchants were induced to offer prizes from tickets to the "Movies" and soda-water checks, to cameras, watches, etc. Upon the presentation of a hundred flies a child could get a ticket to a moving-picture show. The smaller prizes did much to stimulate and keep up the interest among those capturing only a few flies.

Films and slides were exhibited showing the fly and its filthy habits and telling of its dangerous disease-spreading power. A great deal of literature was distributed and much advertising of the crusade was done. Even the ministers mentioned the subject from the pulpit.

The grand total of 224½ pounds was killed, or more than 37 bushels. This is calculated to amount to 7,172,000 flies during the ten weeks!

"Considering the billions of flies that might easily have descended from these had they been allowed to live, we think the crusade was eminently worth while," says Dr. Clary. We think so too, and congratulate Hutchinson on its novel method of attacking the problem and upon its success.

The Gary Hygiene Bulletin.

A new idea in health bulletins comes from Gary, Indiana, the new city which has introduced so many model plans throughout its organization and especially in its school system. Two copies of the *Hygiene Bulletin* have been received, pamphlets of twelve and sixteen pages respectively which would be a credit to many health departments. The bulletin is published by the Hygiene Department of the Gary Public Schools and it is announced that "the purpose of this Bulletin is to give to the pupils and patrons of the public schools information obtained from the City Board of Health and the Public School's Hygiene Department records, concerning the births, deaths and causes of same, the cases of contagious diseases occurring and other items of interest; also to print reports and papers prepared in any classes, concerning hygiene or sanitation. Where possible these bulletins are used for supplemental study."

The March number of the bulletin is largely devoted to the fly problem and contains articles by students in the public schools on the life-history of the fly, fly traps, methods of controlling flies and on experiments which have been made on fly breeding by the pupils. The articles are well written in an attractive style and are illustrated by original drawings and photographs. In addition there are statistical reports of the Board of Health and its inspectors.

The July number is a milk bulletin and the head of the science department speaks editorially of it as follows:

"This Milk Bulletin was prepared by the eighth grade class in elementary chemistry of the Emerson School, Gary, Indiana.

"The time allowed, including the inspecting trips, was only three weeks, so there was no time for the rewriting of the papers, as the work was done at the end of the school year.

"The work was divided between the boys' and the girls' sections of the class, giving to each those subjects which would appeal to them most.

"Some of the work had to be obtained, necessarily, from literature, but the papers were made original as much as possible. These papers of the *Bulletin* were chosen in

some cases because they covered the subject the best, and in other cases because they were the only ones.

"The pupils took a great deal of interest in the *Bulletin* and learned a great many things, which could not have been impressed in any other way."

Main articles are entitled "Breeds of Dairy Cattle," "The Health of the Herd," "Cleanliness of the Herd," "The Proportion of Milk Constituents," "Condition of Containers," "Bacteria in Milk," and "An Inspection Trip to Dairies"; several of them illustrated with good original photographs.

Such a bulletin serves more than one purpose since it not only is a good department bulletin published with minimum trouble and expense, but also it interests the rising generation in public health matters and through them their parents who will read the work of the school children with more interest than they would the ordinary bulletin.

Anti-Typhoid Inoculation.

In the October number of *Nature* there appears an article touching on the question of anti-typhoid inoculation and its necessity in the present war. It points to the fact that in active service sanitary arrangements are often impossible. When it comes to a choice between polluted water or no water the alternative taken is necessarily polluted water. The reasoning is therefore that protective treatment should be applied to all the armies so as to keep down the typhoid. That the preventive treatment is efficacious is well brought out in statistics from all over the world.

Four instances are cited:

1. *British Army in India.* There were 19,314 soldiers. The case rate among the inoculated was 5.39 per 1000. Among the uninoculated the case rate was 30.4 per 1000.

2. *United States Army.* Compulsory inoculation in 1911 included over 90,000 men. In 1913 there were three cases and no deaths. Inoculation has been compulsory since winter.

4. *Canadian Pacific Railway.* Among 5,500 protected by inoculation there were

two cases, while among 4,500 unprotected there were 220 cases.

The paper concludes by stating that no man has the right to endanger the health of his neighbor by contracting typhoid and thus becoming a carrier, when protective inoculation can so easily prevent it.

Chicago Ventilation Ordinance Upheld.

The bulletin of the Department of Health of Chicago for September 26, 1914, reports the good news that the Department has won its fight upholding the ordinance which demands that theatres provide their patrons with clean wholesome air. After a year's litigation which was backed by a large number of the theatre owners of Chicago every contention of the Department and every provision of the ordinance was sustained by the court.

"Over 2,800 pages of testimony were taken from experts, not only from Chicago but from other states as well. All features of the ordinance were thoroughly investigated, the quantity of air required per person; the carbon-dioxide content and the matter of prevention of draft received the closest scrutiny; the methods employed by the Department in taking air samples and laboratory methods in analyzing the same were gone over; in fact, samples were analyzed by the Department's chemist in the presence of the master. These samples were taken in various places. In the master's room and in various other indoor localities, also samples of outside air, which were sealed and analyzed by the chemist without his having any knowledge as to where they were obtained. In short, the entire case from beginning to end was marked by its comprehensiveness and attention to detail.

"The complete vindication of the Department's contention and the upholding of the ordinance, upon which its efforts were based, is a long step forward toward securing the much needed reforms in the moving picture theatres of this city."

The Friedmann Cure.

The board of medical officers of the United States Public Health Service, appointed in

March of last year to investigate the Friedmann cure for consumption, has completed its work and submitted its report, which will be published shortly in pamphlet form. In brief, the conclusions of the board are:

"The claim of Dr. F. F. Friedmann to have originated a specific cure for tuberculosis is not established by our investigation.

"The claim of Dr. F. F. Friedmann that the inoculation of persons and animals with his organism is without harmful possibilities is disproved."

Tuberculosis as Cause and Result of Poverty.

In a stimulating paper by Dr. S. Adolphus Knopf, published in the *Journal* of the American Medical Association for November 14, the relationships between poverty and tuberculosis are brought out. "The predisposition to tuberculosis in children," says Dr. Knopf, "which is surely and often inherited, comes from what might be called a physiologic poverty not necessarily always tuberculous. Later-born children are more liable." Child labor and the housing of the poor are dwelt upon as responsible for a great deal of tuberculosis. Such considerations emphasize the magnitude of poverty as a cause. As a consequence also of the disease, poverty stands out no less conspicuously. Tuberculosis is shown to be always costly and a great economic as well as social and sanitary problem. The conservative estimate of its annual economic cost in the United States, made by Prof. Irving Fisher in 1912, was \$1,235,000,000, not including the cost of tuberculosis in childhood. The serious results from the exclusion of the tuberculous from employment are brought out, and the magnitude of the whole problem is set forth.

A paper by Dr. J. N. Hurty in the same issue relates to the close connections between poverty and other diseases, such as typhoid fever, yellow fever, smallpox, the occupational diseases, and venereal disease.

Foot-and-Mouth Disease.

"The disease may affect human beings, especially children, being transmitted by

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milk, from diseased cows (experimentally verified) and by butter and cheese made from such milk as well as through wounds and in other ways. While the course usually is favorable, an epidemic described by Siegel had a mortality of 8 per cent. The manifestations are fever, digestive disturbances and vesicular eruption on the lips, the oropharyngeal lining ('aphthous fever') and sometimes on the skin. Where there is danger of contamination of the milk with the foot-and-mouth virus, thorough pasteurization of all milk and milk products is doubly indicated."

Journal of the American Medical Association, November 14, 1914.

Lecture Courses for Health Department Employees.

"The work of the Department of Health is so varied and progress in public health work in recent years has been so rapid, that it is difficult for the various inspectors and nurses employed in the Department of Health to keep informed concerning the activities of the different bureaus. Yet in order to render efficient service both to the Department and to the public at large, it is highly important that they not only possess such information, but in addition be familiar with progress in medical and sanitary science. With this in view, the Bureau of Public Health Education of the New York City Department of Health, has organized a series of lectures constituting, as it were, a school of sanitary science for its employees.

"In conformity with the general purpose of the lectures, bureau lines have been disregarded, and four courses arranged, as follows:

"A. Course for Medical Inspectors and other Physician Employees of the Department.

"B. Course for Lay Inspectors (Food and Sanitary).

"C. Course for Hospital Nurses (Willard Parker, Riverside and Kingston Avenue).

"D. Course for Field Nurses (Infectious Diseases, Child Hygiene)."

Preventable Blindness in the Newborn.

In the *Journal* of the American Medical Association for November 14 a paper by Dr. Richard J. Tivnen summarizes the situation as to preventable blindness from ophthalmia neonatorum. Statistics from a number of sources are presented to show the numbers of cases. The author asserts that if the simple Credé method of silver nitrate prophylaxis were in universal use "it is certain that the proportion of ophthalmia neonatorum cases would be greatly reduced; and if, in conjunction with the method, practical measures might be devised to insure the early recognition and early treatment of the disease, it is not unreasonable to assert that such infections might be almost entirely eradicated."

In conclusion the plan of campaign recommended by the New York Association for the Blind is given approval:

"*Educational*.—Through the preparation, publication and dissemination of printed matter, emanating from the committee or approved by it; through public lectures, addresses and exhibits; and by means of the press, on whose generous assistance the committee greatly relies.

"The object sought is to spread among the general public the knowledge that infant ophthalmia is a dangerous, infectious disease, fatal to sight unless checked at the time of the birth of the child, easily preventable then if simple precautions are taken; to inform parents, more especially, of the dangers which threaten the sight of their children at birth, and the preventive measures which should be taken; and to advocate the universal adoption of such measures.

"*Legislation*.—To promote such legislation as may be needed to accomplish the object in view—the prevention of the unnecessary blindness of infants.

"*Coöperation*.—In furtherance of the same object, the committee seeks and invites coöperation with medical societies, health officers, ophthalmic, maternity and other hospitals in which children are born, dispensaries, city missions, settlements; with schools, institutions and associations for the blind, and with all societies engaged in work for children and for social betterment; with dis-

strict visiting nurses, and with all persons who are already engaged in this work or who desire to help in it."

The Milk Bottle as Educator.

In the publicity campaign it has been suggested by Dr. F. E. Fronczak, Health Commissioner of Buffalo, "that the milk bottle could be made use of; that it could have a mission and carry a message in its daily entrance to the household. It could carry a label or tag furnished the distributor by the department, with brief epigrammatic information how to care for milk, what to do when the baby is sick, the danger from flies and the like. In other words, make the milk bottle an educator as well as a carrier. The message day by day could not but awaken interest and make an impression."

Control of Habit-Forming Drugs.

Through the operation of a city ordinance which has been in effect for nearly two years in Jacksonville, Fla., a considerable amount of information regarding drug habits has been secured, relating to the extent of these habits and the various factors entering into their formation. Aside from the provisions common to most such laws, the ordinance provides that:

"(a) All druggists filling prescriptions for habit-forming drugs shall keep a record of all such prescriptions and that the originals

shall be open to inspection by the police and health departments.

"(b) That every physician writing a prescription containing more than a specified amount of opium derivatives or cocaine, shall place thereon the name and address of the individual for whom it is intended and shall send a copy of the prescription to the health department.

"(c) That the health department may, if it be deemed expedient, furnish free to any habitual user, a prescription for the drug employed."

"These three," says Dr. Terry, Health Officer of Jacksonville, "are the essential features of the law concerned with the collection of various information. Through this means we have been able to obtain a very accurate census of the users in the city, the drugs employed, and the amounts taken. We have likewise learned which physicians and druggists deal principally in this traffic and, through the last-mentioned provision, I have come into personal touch with about 300 users and have been able to obtain from them information relating to the formation of their habits."

The information is summarized in the course of a paper by Dr. Terry in the October number of the *Journal of the Florida Medical Association*, which concludes with a plea for the coöperation of the medical profession in the suppression of the evil.

PUBLIC HEALTH NOTES.

Vermont's Poison Lesson.

The recent tragedy in Vermont, in which fourteen persons were killed and a number of others blinded by drinking whiskey adulterated with wood alcohol, brings forcibly to mind the fact that legal provisions throughout the country are inadequate to prevent wood alcohol poisoning. The Vermont incident is an example of what happens every little while in other states.

A very recent instance is that of a number of Armenian rug weavers in New York City who were poisoned by drinking anisette, consisting largely of wood alcohol. Three of the men died, and two were blinded. As the groceryman who sold the anisette and the man who manufactured it have no property, it is not possible to secure damages for those who were blinded, nor for the widows of the men who died. These cases may be prosecuted by the District Attorney and small fines imposed, the payment of which would simply enrich the state, but in all probability have little or no effect upon the problem as a whole.

The difficulty goes further back than even the small manufacturer—that is, to the producers of wood alcohol who rectify this poison so highly that it cannot be distinguished from grain alcohol, known to the trade as Cologne spirits. This rectified wood alcohol, possessing all of its original poisonous qualities and closely resembling grain alcohol, is put on the market under various misleading names, among them being Colonial spirits. As Cologne spirits and Colonial spirits look, smell, and taste alike, we cannot wonder that the poisonous alcohol is sometimes used instead of the non-poisonous spirit.

The Vermont druggist claims that he ordered, and thought he was using, Cologne spirits, but that he was actually sold the poisonous Colonial spirits.

During the last session of the New York State Legislature, the Committee for the Prevention of Blindness endeavored to have passed a law designed to prevent wood alco-

hol poisoning. At the public hearing on this bill, the danger of confusing Cologne and Colonial spirits was emphasized by the president of the State Pharmaceutical Association. He described a case in which a druggist ordered Cologne spirits, or grain alcohol, to use in preparing his tinctures, extracts, etc. In response to his order he received a five-gallon can labelled "Col. spirits." For some reason this druggist analyzed the contents of the can, and found it to be wood alcohol, the "Col. spirits" evidently being used as an abbreviation for both Colonial and Cologne spirits. Since as little as a teaspoonful of wood alcohol has caused blindness, this man's precaution evidently averted just such a tragedy as has occurred in Vermont.

In spite of the abundance of such evidence as this concerning the dangers of allowing wood alcohol to be sold under present conditions, those interested in the manufacture of this product were successful in their efforts to have the Committee's bill defeated.

The New York City Department of Health has recently amended its sanitary code to require all forms of wood alcohol to be labeled "wood naphtha" and to bear a poison label, together with the skull and crossbones. This is the most definite step that has thus far been taken in this country toward preventing wood alcohol poisoning from imbibition. This requirement, however, will be effective only in New York City, and will have no bearing upon poisoning following the inhalation of wood alcohol fumes in the industries.

Throughout the State of New York the combined provisions of the State Liquor, Pharmacy, and Agricultural Laws are at present inadequate to prevent death and blindness from swallowing and inhaling wood alcohol.

When by state law or through rulings made by the state departments, all forms of wood alcohol are labeled poison, as is required by the New York City department of health, and wood alcohol in the industries is replaced

by industrial (denatured) alcohol, we shall cease to hear of these pathetic and wholesale disasters.

First Year's Work of the Anderson Foundation.

In the *Survey* for October 10, Dr. D. B. Armstrong outlines briefly the excellent work which the New York Association for Improving the Condition of the Poor has accomplished during the past year. Mrs. Elizabeth Milbank Anderson provided the Association with funds sufficient for the creation of a Department of Social Welfare.

"The work of the department was divided at the start into four principal fields. There were founded a Bureau of Public Health and Hygiene, a Bureau of Welfare of School Children, a Bureau of Food Supply and a Commission on Ventilation.

"The department believes that investigation and research should precede propaganda and official action, especially in health matters where there is doubt as to the actual values concerned. Consequently, the work of the department and particularly of the Bureau of Public Health and Hygiene has been in large part of a research character. Its investigation, both social and bacteriological, of bathing conditions in and about New York city was preliminary to the recent action of the Department of Health and the Department of Public Works in the restriction and control of river and land pool bathing.

"Most of the time and funds of the Bureau of Public Health and Hygiene, however, have been devoted to a two year's study of the relationship of the house fly to diarrheal disease or summer complaint among infants.

"The Bureau of Welfare of School Children has entered two main fields: the first, that of the medical inspection and treatment of physical defects among the school children. Investigations were carried out in coöperation with the Bureau of Child Hygiene to determine the needs of the school child, the amount of physical defect, particularly of the eyes, teeth, and nose and throat, and the adequacy of present remedial facilities.

"The Bureau of Food Supply established the Food Supply Store, at the present

time conducted mainly as a service to the families receiving food through the Family Welfare Department of the association. It contemplates in the near future the opening of the store to the people in the community, so that it may serve not only as a factor of economic importance in general food distribution, not only as a model of sanitary equipment and operation, but also as a center, together with the branches to be established, for popular educational propaganda."

These do not cover all the Department's activities but it may be seen that they are many and are those "that the city, representing society will eventually carry on."

"It is the aim of the Department of Social Welfare to make its methods positive, coöperative and constructive. Its doctrine is that of prevention rather than palliation. The spirit of the department grows out of a genuine belief in the ultimate efficacy of the growing social consciousness as an instrument for the correction, by evolutionary methods, of the social maladjustments of modern times."

Cure for Leprosy.

Supplement 20 to the *Public Health Reports* of October 16, 1914, contains a most encouraging report by Dr. Victor G. Heiser, Director of Health for the Philippine Islands on the Treatment of Leprosy by the Hypodermic Use of a Chaulmoogra Oil Mixture.

All cases of apparent cures by X-Rays and other remedies have invariably returned before the expiration of a year. Being impressed with the apparent success which attended hypodermic treatment with chaulmoogra oil the Service undertook the treatment of twelve cases of different types on February 21, 1912.

The summarized results to date follow:

Cases placed under treatment.....	12
Cases taking treatment throughout period.....	9
Cases apparently recovered and microscopically negative.....	1
Cases in which clinical evidence of leprosy practically disappeared.....	4

Cases showing only slight evidences of improvement.....	1
Cases declining to take prescribed treatment.....	3

There are over twenty persons who have become microscopically negative since they began treatment.

Dr. Heiser concludes,

"The present stage of the development of the treatment herein described does not warrant a claim that anything like a specific for leprosy has been found, but experience does show that it gives more consistently favorable results than any other that has come to our attention, and it holds out the hope that further improvement may be brought about. It produces apparent cures in some cases, causes great improvement in many others, and arrests the progress of the disease in almost every instance."

Tetanus Spores in Vaccines.

Bulletin No. 95 of the United States Hygienic Laboratory gives the results of a prolonged study of the effects of tetanus spores in vaccines.

Not one of thousands of samples of vaccines examined during a period of twelve years has been found to contain the tetanus bacillus.

A vaccination sore seems to favor ejection of foreign matter, tetanus spores and *Bacillus Welchii* rather than the absorption of same. Eight rhesus monkeys vaccinated in five places with vaccine virus heavily contaminated with tetanus spores all developed good "takes" but none contracted tetanus. One remained well after tetanus spores were rubbed thoroughly into his "take."

Children in Tuberculous Families.

An investigation into the effects on children of living with tuberculous parents recently completed by the United Hebrew Charities of New York City, shows that 30 per cent. of such children are affected with open tuberculosis in one form or other. The investigation was conducted by Dr. Maurice Fishberg, and covered a period of seven months. The children were examined in the spring and fall and were also reexamined at

intervals in the summer. The homes of each of the children were visited and studied.

"In this manner," says the report, "217 tuberculous families were carefully inquired into. Of these, 136 live in the lower East Side and 81 in the Bronx. The conditions ascertained are worthy of recording, not only because this is the first examination of the kind that has been made in this country, but also because it throws much light upon tuberculosis in general.

"These 217 families live in 717 rooms, averaging 3.3 rooms per household. These 217 families comprised 1,129 persons. That these people were not excessively overcrowded is evident from the fact that there were 1.57 persons per room. Another way of showing the mode of life of these people is by mentioning that there were only 658 beds, couches, cribs, etc., showing that the average was .58 per person. In other words, roughly speaking, there were two persons to a bed. An inquiry was also made as to the number of consumptives who have a separate room to themselves, and it was found that out of 274 consumptives only 112 had a separate room. It is also noteworthy that only 136 sleep in a bed to themselves; the rest, consisting of 138, have one or more persons sleeping with them in the same bed; some were found sleeping on chairs, on the floor in the kitchen, etc."

As a result of this investigation it was discovered that "out of 692 children, one or both of whose parents were tubercular, 56 were suffering actively from the disease; 145 showed signs and symptoms, which place them in the category as suspects, the majority of whom will undoubtedly become consumptives in the near future unless strong measures are taken to give them proper care."

Health Education Bureau.

The Physical Director's Society of the Y. M. C. A. has decided to establish a Health Education Bureau, according to the October issue of *Physical Training*. The Society makes the following suggestions:

1. The establishment of a Bureau.
2. The creation in *Physical Training* of a Health News Section, through which physical directors will be kept informed of current

literature on health and modern methods in health education.

3. The issuance of bibliographies on the subject of health and allied subjects.

4. The creation and publication in large quantities of special leaflets or pamphlets on health subjects which can be supplied to Associations at reasonable rates and distributed by them liberally.

5. The compilation of a handbook on health.

6. The larger development of special lectures, stereopticon slides and films, loaned to Associations at small cost.

7. The arrangement and promotion of exhibits. (a) Illustrative of Y. M. C. A. work; (b) Special arrangements with other organizations, such as:

1. Scientific Temperance Federation.
2. Oral Hygiene Society.
3. Child Welfare Society.
4. Social Hygiene Societies.
5. Tuberculosis Societies.
6. Playground Association.
7. Boy Scout Movement.
8. Safety First Organizations.
9. First Aid and Life Saving Societies.
10. School Hygiene Association.
11. Federal Health Service.
12. The Life Extension Institute.
13. Movements against quacks and quack medicines.

(c) The promotion of health surveys; (d) Preparation of suggested outlines for reading on health subjects.

Public Health Nursing as Prize.

Two prizes, each consisting of two months' services of a public health nurse, were awarded by the State Charities Aid Association of New York to the two granges which sold the largest numbers of Red Cross Christmas Seals during the 1913 campaign. The nurse has just finished her work under the direction of the winning granges, as reported in a recent number of the *Association News*.

"The nurse began her work at each place following well-attended meetings of the Grange at which representatives of the State Grange Public Health Committee, together with representatives of the Tuberculosis

Committee of the State Charities Aid Association, congratulated the Grange on its success and emphasized the importance of this experiment in public health nursing in rural districts.

"The work consisted in visiting the sick in their homes, instructing the well members of the families in the care of the patient, assisting the school medical inspectors, investigation as to the kinds and causes of sickness, and the best means of solving the problem of home care in rural communities. As in all public health nursing the nurse worked in coöperation with attending physicians and under their direction.

"The employment of such nurses by town, village and city health officers is authorized by the public health law and the Public Health Committee of the Grange, the State Department of Health, and the State Charities Aid Association hope to make the work of the prize nurse an object lesson in practical public health nursing in rural communities."

Prevention of Mortality in Pregnancy.

In view of the increasing attention now being paid to prenatal instruction and care by visiting or public health nurses, the following remarks from an address by Frederick L. Hoffman, Statistician of the Prudential Insurance Company, before the National Organization for Public Health Nursing last April, are significant as emphasizing the care of the mother in contradistinction to that of the child.

"If we had adequate sickness statistics for this country, the public appeal for an adequate nursing service could be made many times stronger and more convincing than at the present time. It would then be less a matter of sentiment and more a matter of fact. If we could establish statistically the necessity for adequate nursing in necessitous maternity cases, we would not only render an important service to pregnant women, but we would materially aid in reducing the lamentable mortality in pregnancy, which at the present time amounts to over fifteen thousand deaths per annum. This is unquestionably one of the most neglected phases of our modern public health movements. There is a most urgent need for an

intelligent and convincing presentation of the facts. There can be no question of doubt but that by an efficient nursing service, on the one hand, and by an extended use of proper institutional facilities, on the other, a material reduction of the mortality in pregnancy could be brought about within a very short period of time. There is too much reliance upon leaflets and arguments, rules and regulations, and not enough attention is paid to the mechanical factors which determine the death-rate and which are largely within human control."

Labeling for Medical Preparations.

The Department of Agriculture, through the Bureau of Chemistry issued on October 18, 1914, some very pointed suggestions to makers and proprietors of medical preparations, as to their proper labeling in order that they will comply with the Food and Drugs Act as amended.

These suggestions deal with the following:

1. Claims of Therapeutic Effects.
2. Indirect Statements.
3. Indefinite and Sweeping Terms.
4. Testimonials.
5. Refund Guarantee.

Any one interested in this letter may obtain a copy of it from the Office of Information, United States Department of Agriculture, Washington, D. C.

Advantages in Bottling Pasteurized Milk While Still Hot.

The Office of Information of the United States Department of Agriculture has announced that laboratory tests indicate a possibility of using this method to advantage. We quote in full:

"Investigators in the United States Department of Agriculture have found that the process of bottling pasteurized milk while still hot has several advantages which make it seem probable that this method would prove both economical and efficacious when practiced on a commercial scale. In an article printed by permission of the Secretary of Agriculture in the *Journal of Infectious Diseases*, the authors S. H. Ayers and Wm. J. Johnson, Jr., declare that this method

results in bacterial reductions as great as, or even greater than, by pasteurization in bottles.

"The principal advantage of the latter method for the ordinary systems in commercial use is the impossibility of the milk becoming contaminated again while being bottled. There is also some saving of milk, because there is no loss from evaporation. On the other hand, when milk is pasteurized in bottles, it is customary to cool the bottles by placing them in cold water. This necessitates the use of absolutely water-tight caps, otherwise some of the cold water is likely to find its way into the milk bottles, and even a very slight leak may result in contamination. Water-proof caps are not only expensive, but care is essential to see that they actually are waterproof, and moreover, bottles with chipped or otherwise damaged tops cannot be used, no matter how nearly perfect the cap may be.

"Laboratory experiments conducted by the investigators indicate that milk may be pasteurized, bottled hot, capped with ordinary cardboard caps, and cooled by a blast of cold air economically and with very satisfactory bacterial reductions. The air-cooling process requires a somewhat longer time than cooling by water, but in the laboratory it was found that thoroughly pasteurized milk, bottled immediately, could be cooled slowly without increasing the bacterial content. Whether or not the experience of the laboratory will be found true in commercial practice, remains to be seen. The Department of Agriculture, it is announced, will conduct experiments with a view to determining this important point.

"Before the milk is poured into them, the bottles should be steamed for two minutes, the authors are careful to point out. This removes all danger of infecting the milk from the bottles, and is another advantage that this new method possesses."

Training of Teachers in Hygiene.

Emphasis is laid upon practical methods in training teachers in hygiene with special reference to their future professional work, by Dr. Carstairs C. Douglas, of Glasgow, in the October *Journal of State Medicine*. The

course conducted by Dr. Douglas for the teachers in training under the Glasgow Provincial Committee consists partly in demonstration lectures and partly in visits to certain schools placed at the disposal of the Committee. These practical visits constitute about one-third of the whole hygiene course. The first visits concern themselves essentially with the school building and the environment of the children. Measurements and observations are made, bearing on lighting, ventilation, cleanliness, etc., and oral questions are carried on. The remaining visits "deal almost exclusively with the child, recognizing that, next to the parent, the teacher in an elementary school has the best chance of observing deviations from the normal in health." The students have the opportunity to observe cases of poor nutrition, mal-development, anæmia, rickets, etc. The recognition of morbid conditions of ordinary occurrence is also dwelt upon. Teachers receiving training of this kind, it is stated, are of great assistance in the medical inspection of school children. It is added, however, that such work can only be carried out where a number of schools and a large number of children are at the disposal of the training institution.

Disposal of Camp Excreta.

An ingenious apparatus for the disposal of excreta in camps, the joint invention of Dr. Myer Coplans and Mr. James Menzies, is to be adopted in one of the English camping areas. It consists of three parts: (1) a partitioned chamber for the reception of excreta; (2) a condenser; and (3) a receptacle for the condensed products. The mixed fæces and urine are poured into a cylindrical tank divided into sections by horizontal partitions through a hopper and broken up by a revolving comb. It passes downward through successive partitions, exposed all the time to very high temperatures, thus undergoing complete disintegration. The solid residue comes out at the bottom, carbonised into charcoal. The volatilised products are then led through the condenser and received in a chamber where they settle out into a heavy ammoniacal liquor, a layer of oil and gaseous products. The gaseous products are piped

off to a burner where heat is produced by their combustion to disintegrate the sewage in the partitioned chamber. The ammoniacal layer, the lowest layer of the three, contains pyridine bases which are used as an insecticide against flies, fleas and vermin in general and as a bactericide. The layer of oil is collected and used as a fluid for working the motor which revolves the comb in the cylinder first mentioned. The solid carbonised residue is practically pure carbon which may be used as fuel or for other purposes. "Dr. Coplans and Mr. Menzies," says the *Lancet*, "have not only been successful in showing how much value lies in excretory products but have also demonstrated that these products may be rendered innocuous and disposed of at a minimum cost or even at no cost at all—the heat required for destructive distillation of excreta being provided by the gas which is set free and the petroleum oil for running the motor also being obtained from the results of the same distillation."

Glazed Petri Dish Covers.

Due to the dissatisfaction caused by the use of the ordinary porous Petri dish top, C. C. Young, director of the Kansas State Water Survey, made some experiments with porous covers glazed on the outer surface which gave much improved results. According to Mr. Young, the glazed cover combines the good features of both the glass and ordinary porous tops. Following are a few of the advantages of the glazed covers:

1. Evaporation of the water from the medium is reduced about 60 per cent. but are still porous enough to absorb all water of condensation.
2. The glass bottoms are not scratched and ground when the plates are stacked in the incubators.
3. The glazed surface affords a convenient place for marking with a wax pencil. The marks can be rubbed off as easily as they can from glass.
4. The glaze adds much strength to the cover; consequently the breakage is reduced to a minimum.
5. They slip one over the other as easily as glass.

6. There is less danger of contamination, as the glaze protects the porous part of the cover so that material spilled on a plate is not absorbed.

Antityphoid Vaccination.

"At this momentous crisis in the history of the Empire, the question of protective inoculation of the troops should occupy a prominent position in the minds of us all. The gravest of all risks in time of war is that from devastating epidemics of infective disease. It is only necessary to recall the ravages of typhoid fever during the South African war; there were more than 57,000 cases of this disease, and of a total of nearly 22,000 deaths from all causes, over 14,000 were due to disease, and of these 8,000 were from typhoid fever. Not only at the front, but at home, there is the danger of an outbreak, as the men collect into camps, or are billeted about the country. Some of them may be typhoid carriers, for about 3 per cent. of all cases of typhoid fever become chronic carriers. The danger with which we are menaced can be obviated by means of antityphoid inoculation, the value of which has been proved beyond question, and the data are indisputable. In the British garrison in India, where about 93 per cent. of the men are now inoculated, the deaths from typhoid fever have been reduced from several hundreds per annum to less than twenty. In the United States army there were last year, among 90,000 men, only three cases of typhoid fever and no deaths. In America and France antityphoid inoculation is compulsory. There is also the danger of dysentery and cholera which cannot be ignored; it has recently been announced that cholera has already appeared in Anatolia. An appeal, signed by very eminent medical men, to which we would add our influence, has recently been issued urging that the time has now come when antityphoid inoculation should at once be made compulsory in our Army."

Journal of State Medicine, October.

Lighting and Ill-Health.

"It is often thought that the excellence of light lies in its intensity and one is apt to

overlook the fact that too much light may do as much injury to health as too little. In schools too little light leads to eye-strain and brain-fag, while too much light produces eye and brain irritation, headaches and neurasthenia. Badly arranged lights may lead, in growing people, to bodily distortion and spinal curvature. It is a known fact that the use of spectacles by children is increasing, and in some schools spectacles are supplied and used under medical supervision. It would be very interesting to ascertain what effects would result from an inspection of the illuminating arrangements in schools. In connection with the question of light, Committees of Illuminating Engineering Societies in this country and America are investigating the question of harmful radiations. It has recently been shown that the infra-red rays may be harmful as well as the ultra-violet. Thin plates of marble for screening electric light are now being used; they are about one-eighth to four-fifths of an inch thick and after being polished they are impregnated with oil under pressure at a high temperature. The marble is stated to be so translucent that it will only absorb one-fifth of the light from an electric lamp placed behind it whereas ordinary milk glass cuts off about twice as much. Marble light is practically devoid of the infra-red rays and it has been found that light so produced is very white and agreeable for working conditions."

Journal of State Medicine, October.

Sanitary Sewage Disposal Without Sewers.

The July *Bulletin* of the Indiana State Board of Health contains an excellent description with diagrams and specifications for a small individual sewage disposal system. The system may dispose of the wastes from a house fully equipped with modern plumbing and all the conveniences, or from the old privy and waste pump or sink water, or from the combination of the two.

The plan calls for a non-porous concrete or brick tank sixteen to twenty feet in depth, built on the style of an Imhoff tank. It provides for a chamber for decomposition of sludge as does this tank. It allows the liqui-

fied and settled effluent to run off through four inch porous tile pipe which spreads out fan-like and distributes the effluent through the ground. This tile drain is laid two and one-half to three feet below the surface. A galvanized sludge pipe two inches in diameter permits the cleaning of the digestion vault if necessary.

Sanitary Progress in India and Egypt.

The following article taken from *The American City* for August, 1913, illustrates well the effect of the advance of civilization along health lines in some of the great semi-civilized countries. Where the population is so dense as it is in India, for instance, the problem of preventing the spread of disease is a difficult one. It is to the credit of the English administration in these countries that such good results are being obtained.

"The press of India, both Anglo-Indian and native, is championing a cause which a few years ago would have seemed hopeless in a country where progress is so difficult. To convince a people, with the prejudices of centuries behind them, that sanitation is of the utmost importance to them physically and morally, is no easy task. But in the last thirty years various advancements have been made that make more rapid progress possible now. During this period princes have had their sons educated in foreign countries; high schools have been established by missionaries; and various commissions, considering the needs of the country, have changed the occupations of the people and introduced Western ideas into the larger towns. What has been accomplished along the one line of sanitation, with the intelligent backing of these various agencies, may be inferred from the report of the health of the British troops in India, which is duplicated in the report of the native troops. This report reads that the death-rate of the British troops in the four years 1875-79 was 20.37 per thousand, and in 1911 and 1912 the figures were respectively 4.89 and 4.62 per thousand.

"Remarkable sanitary results have also been attained in Egypt, where the outcome of the British occupation a generation ago was enigmatical. Here the same mental

prejudices to cleanliness of body and dwelling had to be overcome as in India, but Lord Kitchener's last report shows how the British irrigation schemes, which have changed the face of that great country, were able, during a shortage of water last year, to prevent the famine and misery which usually follow such a catastrophe. He also comments on the results of the education of the rising generation and prophesies that at no far distant time the plague will be under full control."

Teaching Sex Hygiene.

To ascertain whether the people most vitally interested—namely, the parents and the children—are ready for the systematic teaching of sex hygiene in the public schools, the Bureau of Research of the Upper Peninsula (Michigan) Educational Association recently made an investigation. It asked parents, "Do you believe that sex hygiene should be taught in the schools." To this question 92 out of 317 representative citizens, replied, "yes," and 175, "No."

To ascertain the view-point of the pupil, a series of two lectures were given at a representative school. Some time after the lectures had been given a canvass was made. Of the boys, 85 per cent. thought the system good and wished to continue. About 60 per cent. of the girls were in favor of the lectures.

The *Journal of the American Medical Association* thinks that until the preponderating majority of sentiment favors the idea, the proposition of teaching sex hygiene in the schools should be approached with the "utmost caution."

Twenty-one Cases of Typhoid From One Typhoid Carrier.

The June, 1914, issue of the *Journal of the American Medical Association* reports the case of a farmer who after his supposed recovery from typhoid fever infected his three sons and his wife.

Later those who visited and ate at his house showed a marked tendency to typhoid until the number reached twenty-one. At this point an investigation was carried on and the farmer's urine was found to be in-

habited by typhoid bacilli. The investigation showed that each of the twenty-one cases could be traced with reasonable certainty to this one carrier.

Coöperation of Citizens' Organizations and Health Departments.

Health officials who look askance upon the coöperation of unofficial organizations in the affairs of the health department would do well to consider the results achieved in the Bureau of Health of Philadelphia through the assistance of the bureau of municipal research organized in that city six years ago by a group of public-spirited citizens. The benefits thus attained are summarized in the October number of the *National Municipal Review*. Incidentally the changed attitude of the public official toward such coöperation is emphasized.

"Hitherto, distrustful of political enemies, and possibly conscious of administrative shortcomings which he was powerless to correct, the office-holder resented and, so far as he was able, thwarted any attempt on the part of the citizenship to find out what was going on 'inside.' Even yet, employees who have been long in the service instinctively suppress the most innocuous information and conscientiously believe it to be a duty to enhance the mysterious atmosphere supposed to be necessary in the operation of a public office. That active outside coöperation of a type which presupposes searching investigation should be invited and appreciated is quite as indicative of a new order as that it should be available. It is not a matter of accident, however, that at last the public and the official have 'gotten together.' The rapid evolution of the idea of government as an agency for actively and positively promoting the public welfare has fairly forced this situation upon public and official alike."

The Philadelphia bureau of municipal research made, at considerable expense, expert studies which resulted in marked improvements in the methods of medical inspection of school children. At its suggestion a milk commission was appointed, the findings of which were popularized through the Philadelphia Milk Show of 1911 and were embodied in new milk ordinances. Other ad-

vances were the standardization of specifications for the purchase of food supplies for the bureau of charities, the institution of a modern accounting system for public health and charities, and reformed organization in general.

"In a rapidly expanding department, there is always a tendency to add a new division for each added function regardless of its relation to functions already being performed. This growth often results in a straggling ununified organization. This has been very well illustrated in the Philadelphia Bureau of Health. Execution of the housing laws, for example, was vested in three divisions—tenement house inspection, house drainage inspection and nuisance inspection. Laws on the inspection of meat and cattle were enforced by one division, those on milk by another. The disadvantages of such a form of organization are at once apparent. Responsibility is divided, efforts are duplicated, inefficiency results. In order to bring unity and centralization, the departmental organization was studied by the bureau of municipal research. It demonstrated, by means of graphic charts, the illogical sub-division, then existing, and the consolidation necessary for building up a more compact and effective organization." All the changes made by the health officer within the last two years have been in harmony with these suggestions.

Upon his retirement recently, after a tenure of seven years in the office of director of public health and charities, Dr. Joseph S. Neff paid this unofficial organization handsome credit for the part which it had played in increasing the efficiency of the department.

The writer, Dr. N. R. Deardorff of the Philadelphia Bureau of Health, concludes that "although the above sketch by no means exhausts the list of studies made by the new citizen agency for Doctor Neff's department, it serves to show the range of activities and the nature of this new coöperation of official and citizen. For those of us who believe in the efficiency movement in government, Doctor Neff's administration is a most encouraging sign of the ushering in of the new regime. When public officials welcome aid and suggestions and citizens respond to a call so un-

emotional and disinterested, a real and effective democracy no longer seems a dream.

Serum Diagnosis of Syphilis.

According to a recent announcement, the laboratory of the New York State Department of Health has undertaken the serum diagnosis of syphilis by means of the Wassermann reaction, a test now considered essential, not only in the diagnosis of the disease but also as a means of determining the effect and progress of the treatment. When the work is established on a permanent basis physicians will be able to obtain outfits for mailing specimens by filing the name and address of the patient, with the clinical diagnosis.

Saving the Babies.

An interesting comparison of infant death-rates of the City of Dunedin, in New Zealand, and of New York City is given by Dr. C. F. Bolduan in the July number of the *Monthly Bulletin* of the Department of Health of the City of New York. It appears that Dunedin, with a population of 65,000, had an infant death-rate of only 38 per 1,000 births, while New York at the same time had 105 per 1,000 births. In the 12 years ending in 1912, Dunedin brought down its infant death-rate from 80 to 38 per 1,000 births, while in the same period New York's rate came from 165 to 105 deaths per 1,000 births.

From the statistics of 1907 it seems that New York had a 50 per cent. greater death-rate from diarrhoeal, respiratory, and congenital diseases than the New Zealand city. Of course New Zealand enjoys certain advantages over New York which affect these figures to some extent. For instance, its island location, its nearly constant tempera-

ture—40° to 68°—and the absence of slums, are certainly advantages over New York.

Aside from these advantages, other factors have also been working. In 1907 the Society for the Health of Women and Children was organized for the purpose of instructing mothers visiting, instructing expectant mothers and young girls, and also maintaining a baby hospital for the care and advice of sick and poorly nourished babies and their mothers. It is claimed that wonderful results are due to running "Baby" columns in the newspapers. By means of these columns expectant mothers may get in touch with the society and become properly instructed.

Somewhat similar work has been done in New York through the Infant Milk Stations. However, the death-rate from congenital diseases has remained practically stationary. Doctor Bolduan concludes that although New York is handicapped by climatic, social, and economic conditions, its infant death-rate is still far too high. If Dunedin can halve its infant death-rate, certainly New York should strive to do the same.

Health is Promoted by Prevention Parade.

October 2 was Disease Prevention Day in Indiana. It was observed widely throughout the state by appropriate exercises and demonstrations. In Indianapolis there was a great and impressive health parade.

The work and coöperation of the many societies, associations, business organizations, public officials and others was nearly perfect. "The good that the demonstration will do as an education of the people in regard to the value of prevention as a foe of disease is regarded as incalculable," says the *Indianapolis News*.

PERSONAL NOTES.

The following persons were elected to membership in the Association, November 9:

Lewis Otto Bernhagen, Minneapolis, Minn.
Seraphin Boucher, M. D., Montreal, Canada.

Arch Cheatham, M. D., Durham, N. C.
Herbert O. Collins, M. D., Minneapolis, Minn.

Charles Oscar Davis, Milwaukee, Wis.
C. St. Clair Drake, M. D., Springfield, Ill.
Ernest Drinkwater, M. D., St. Lambert, Quebec.

Frank E. French, Madisonville, Cincinnati, Ohio.

James Capers Jones, M. D., St. Andrews Bay, Fla.

Ralph Hoagland, Washington, D. C.
Donald McCaskey, M. D., Witmer, Pa.
Charles M. Mansfield, Washington, D. C.
John A. Moore, M. D., Millerton, N. Y.
Ignatius J. Murphy, Duluth, Minn.
Alvin Roy Peebles, Boulder, Colo.
Amos Clifford Shinkle, Cincinnati, Ohio.
Wm. Percy Van Deusen, Minneapolis, Minn.

Elected November 16.

Frank Garwood Atwood, New Haven, Conn.

Eric William Bacharach, Kansas City, Mo.
Henry Chalmers, Albany, N. Y.
John Wesley Cox, M. D., Grand Forks, N. D.

Albert P. Dossin, Meriden, Conn.
Henry Walcott Farnam, New Haven, Conn.

Richard I. Gordon, Tampa, Fla.
Samuel Charles Harrison, Jacksonville, Fla.

Charles Parmenas Henry, M. D., Reading, Pa.

Joseph Howard Beard, M. D., Urbana, Ill.
Henry Granville Hunter, Montreal, Quebec.

William I. Klein, Kansas City, Mo.
Jno. C. Knight, M. D., Plant City, Fla.
Ernest Ellsworth Laubaugh, Boise, Idaho.
Alvin Lucien Light, M. D., Dayton, Ohio.
Benjamin Weil Loeb, Reading, Pa.
Clarence Paulding Rhynus, Washington, D. C.

Minnie A. Seavey, Sacramento, Cal.
Frederick G. Simmons, Milwaukee, Wis.
Herbert Hamilton Wagenhals, Toledo, Ohio.

William Buchanan Wherry, Cincinnati, Ohio.

Jesse Lee Williams, M. D., Jacksonville, Fla.

Joseph Charles Winslow, Urbana, Ill.

Elected November 20.

Charles William Bartlett, Tampa, Fla.
Errol V. Brumbaugh, M. D., Milwaukee, Wis.

Elbridge R. Conant, Chatham, Ga.
Thomas J. Claffy, Chicago, Ill.
Hugh Farris Dickson, M. D., Covington, Tenn.

Clarence Hull Dobbs, Jacksonville, Fla.
Francis X. Govers, New York.
George M. Gray, Cambridge, Mass.
John Kurtz Hoskins, Cincinnati, Ohio.
Leon Stanley Lippincott, M. D., Brunswick, Maine.

Marion Hyman Lippman, San Francisco, Cal.

Charles John Steffen, Milwaukee, Wis.
Adam Sgwajkart, M. D., Chicago, Ill.
Oscar Pammenio Thompson, Waterloo, Iowa.

Alexander Hamilton Twombly, New York.

INDUSTRIAL HYGIENE AND SANITATION.

Industrial Accidents in the United States.

In a paper by Dr. F. L. Hoffman, Statistician of the Prudential Insurance Company, on "Industrial Accidents in the United States and Their Relative Frequency in Different Occupations," a reprint of an address delivered before the Detroit Conference of Accident Underwriters at Milwaukee last February, an admirable statistical survey of the situation is given. Fatal industrial accidents are analyzed in some detail for male wage-earners, with specific consideration of eighteen specified groups of employments. In the order of their hazardous character the principal occupations are metal-mining, coal-mining, fisheries, navigation, railroads, electrical industries, navy and marine corps, and the quarry industry. The author concludes:

"The data presented emphasize the practical utility of general statistics on the subject, which require to be improved and enlarged in many important directions. A thorough investigation of the entire subject would make a most useful contribution to knowledge and facilitate materially the rational development of workmen's compensation plans, on the one hand, and the prevention of accidents, on the other. . . . That there has been a lamentable waste of life and limb in this country can not be denied by any one familiar with the facts; that our accident rate in general, and in special occupations in particular, is decidedly higher than in European countries reflects our past indifference to this important subject. Above and beyond the scientific aspects of the accident problems lie the broader humanitarian considerations and the growing national conviction that the first duty of all concerned is to prevent accidents, and that compensation or insurance follows as a secondary consideration. But when this is granted, the business of insurance in this direction is one of the greatest usefulness and an economic factor of decidedly impressive importance. . . . The time is bound to come when this field of usefulness will be made to include, and to an

increasing extent, an adequate provision against the pecuniary consequences of sickness. In the furtherance of such plans the statistical foundations of the problem are of special importance, and it is sincerely to be hoped that . . . a substantial improvement will be secured in the official statistics of industrial accidents as well as in the statistical information regarding accidents and their causes published by the insurance companies."

Do Safety Organizations Pay?

The *Bulletin of the American Museum of Safety* for October contains the following, which should do much to convince the skeptics:

"The Whitaker-Glessner Company of Wheeling, West Virginia, have informed the Museum that, during the time accidents were decreased (64.3 per cent in 1912 and 85.6 per cent in 1913 over the record of 1911), the Company suffered no loss of production. On the contrary, the sum total of safety work has resulted in a material increase in production throughout the plant.

"At the Raritan Copper Works, Perth Amboy, N. J., during the year from September, 1913, accidents decreased 22 per cent. As the Company's safety department has been in operation for little more than half of that period, however, the accident record really shows a decrease of 34 per cent. From September, 1913, to February, 1914, the accidents totaled 112; from March to September, 74.

"The Copper Queen Consolidated Mining Company has just issued the first annual report of its safety department. It was difficult to make a comparison of the year's record with those of former periods, as complete accident records had not been kept previous to the organization of the safety department. Nevertheless, the Company has found that fatal accidents have been reduced 55 per cent. and serious accidents about 40 per cent.

"These figures show what can be accomplished by coöperation. To every officer and employee in these organizations, credit is due for the splendid 'Safety' records made by their Companies."

The Use of Animals in Testing for Gas in Mines.

A recent publication, Technical Paper No. 62, of the Bureau of Mines, presents the results of investigations on the Relative Effects of Carbon Monoxide on Small Animals. The conclusions have been summarized as follows:

"In testing for gas in mines small animals may be used repeatedly without danger of their being less susceptible to carbon-monoxide poisoning after many exposures than after the first, if they are allowed to recover between exposures.

"Canaries are less resistant to carbon-monoxide poisoning than mice, chickens, rabbits, guinea pigs, or dogs. It is recommended that canaries be used whenever possible and that at least three of them be carried by an exploration party.

"Men may display distress in the presence of proportions of carbon monoxide as small as 0.10 per cent. whereas small animals in the same atmosphere may show no signs of being affected."

The Fatality Rate in Metal Mines.

"It is gratifying to note that the fatality rate in the metal mines of the United States was lower in 1913 than in 1912," says Albert H. Fay, engineer of the Bureau of Mines, in a technical paper just issued.

"The number of men employed during 1913 was 193,088, as compared with 169,199 for 1912. The fatality rate was therefore 3.54 per 1,000 men employed as against 3.91 per 1,000 for the year 1912 and 4.19 for 1911.

"While the total number of persons killed in the metal mines during 1913 was slightly more than in 1912, there were about 24,000 more men employed, so that the rate is reduced to 3.54 per 1,000 employed during 1913 as compared with 3.91 for 1912. A number of the states show a slight increase, but a majority of the principal mining states show marked decreases as follows:

"The important mining states showing a continuous reduction of fatality rates during 1911, 1912 and 1913 are Idaho, Michigan, Montana, Nevada, New Jersey, South Dakota and Utah, representing in 1913, 38 per cent. of the mining industry. Of the states showing a decreased fatality rate during 1913 as compared with 1912 only, may be mentioned Alaska, Alabama, Colorado, New York, Oklahoma, Tennessee, Wisconsin and Wyoming.

"This gradual reduction is to be accounted for largely by the introduction of safety appliances, better supervision and a more strict enforcement of rules and regulations of the mining companies, and a closer observance of the state laws. Practically all of the larger companies, and many of the smaller ones, have done much in safeguarding their employees. They have inaugurated the 'safety first' movement with the results above mentioned. By first-aid treatment many slight injuries have been cared for, pain relieved, and a cure effected in a short time, so that many of these injuries have been of short duration and kept out of the 'serious injury' or 'fatality' class."

The number of men employed and the number of men killed in and about the metal mines in the United States during 1911, 1912 and 1913 is shown in the following table:

Year.	Metal mines.		
	Number employed.	Number killed.	
		Total.	Per 1,000 employed.
1911.....	165,979	695	4.19
1912.....	169,199	661	3.91
1913.....	193,088	683	3.54
Average for three years.....	176,089	680	3.86

Telephone Work and Sight.

"According to the Bulletin of the Ohio State Board of Health there are in the United States about 125,000 telephone girls whose average term of service is three years or less.

The working hours are about eight per diem; the average number of calls is about 140 per hour. The operator sits facing a switch-board which is covered with numbers, each of which has a small signal light that flashes on and off as the call is completed. To complete one call means four flashes of light, and as the average number of calls is 140 per hour rising to 225 or more during the rush hours, the operator's eyes are exposed to from 500 to 1,000 flashes of light every hour. This results in fatigue to the eyes, not to mention the physical strain. The symptoms of eye-strain which the girls develop are headache, dulness, indigestion, nerve-strain, insomnia, colds, &c."

Journal of State Medicine, October.

Lead Poisoning in the Smelting and Refining of Lead.

The Department of Labor Statistics, United States Department of Labor, presents in *Bulletin No. 141 (Industrial Accidents and Hygiene Series No. 4)* a detailed study of conditions which exist in the smelting and refining of lead.

The Bulletin includes a study of twenty plants, having an average daily pay roll of 7,500 men. Statistics collected in 1912 show that there were 1,769 cases of plumbism in 19 plants in the United States. "Considering how little information it was possible to obtain in many of the plants, it does not seem an exaggeration to say that the number of cases found, falls far below the truth, and that the record for the smelting industry in the United States for one year is at least 1,657 (or 1,769) men poisoned among 7,400 employed."

Dangerous processes due to dust are: 1. Unloading the ore. 2. Crushing and screening ores. 3. Refining the metals secured by smelting.

Due to fumes: Roasting and Smelting.

The following remedies are suggested:

1. Construction: The building must be very roomy, light, well ventilated, the walls clean, and the floors smooth and hard.

2. Sanitary Equipment: Proper washing facilities, and compulsory cleanliness.

3. Dust Prevention:

4. Prevention of fumes.

5. Control of workmen.

6. Medical Inspection.

The Bulletin also contains five Appendices which deal with: Regulations, Medical Inspection, and Care, in English, French and German Smelters.

Appendix 1 is of especial interest for it seems to prove that:

1. Lead sulphide is soluble in human gastric juice.

2. The solubility of lead sulphide is less than that of basic lead sulphate or basic lead carbonate, but the sulphide is sufficiently soluble to be dangerous to the health of persons engaged in mining and milling lead sulphide ore, if the mining and milling processes involve the production of dust.

3. The persons engaged in mining and milling lead sulphide ore should therefore be protected in the same way as workers in other dangerous lead industries.

Industrial Accidents. Their Compensation and Prevention.

In the monthly *Bulletin of the American Museum of Safety* for September, 1914, Mr. Carl M. Hansen, Secretary, Department of Accident Prevention, Inspector and Merit Classification, Workmen's Compensation Service Bureau of New York, ventures the opinion "that industrial accidents constitute one of the greatest, if not the greatest, waste in the United States."

"The actual number of workmen killed and injured annually in the United States is not definitely known, due to lack of coordination in statistical departments of the various states. The best authorities, however, on data available have estimated our fatalities of from 40,000 to 45,000 annually and our non-fatal accidents as producing an annual loss of 200,000,000 working days. Reviewing these figures and putting them on a cold dollars and cents basis, estimating the value to society of each man killed of \$5,000 and \$2.00 as an average wage of the non-fatal injured, the economic annual loss sustained to the nation as a whole amounts to approximately \$600,000,000—an amount which must in some way or other be charged

to the production cost in the various industries where the accidents occurred. This, however, does not include the indirect loss accruing in the form of restricted opportunities suffered by the dependents left by these killed and crippled wage-earners. What that amounts to it would be impossible to compute with the insufficient data on hand. I make bold to opine, however, that industrial accidents constitute one of the greatest, if not the greatest, waste in the United States."

Twenty-two states in the union have "passed some form of legislation bearing upon the subject of specific compensation for injuries sustained by workers in pursuit of their daily vocations." These laws "differ radically in application but are all founded on the same general principles, namely:

"1. To furnish automatically certain prompt reasonable compensation to injured employees and their dependents.

"2. To utilize for injured employees a large portion of the money wasted in litigation under the old common law liability system.

"3. To provide a tribunal distinct from the courts where disputes between employer and employee in reference to compensation for work accidents may be settled promptly with a minimum of cost to either party.

"4. Last, but by no means the least important, to provide an economic incentive for the reduction of work accidents.

"Different systems of insurance are provided in most of the laws passed, and in all laws operating successfully it is well to note that four distinct systems are provided, as follows:

"1. Self Insurance, where the financial responsibility of the employer warrants it.

"2. Mutual Insurance, under private management.

"3. Mutual Insurance, under supervision of a state official.

"4. Our long-adhered-to system of insurance through private stock companies.

"The premium which an employer pays for insurance, represents the amount to be distributed over his product, afterward to be reflected in the final purchase price at which the goods are sold to the consumer."

In New York the rates for compensation insurance are computed by the Workmen's Compensation Service Bureau. This bureau is composed of the twenty-three leading stock liability insurance companies in the United States and they write from 85 per cent to 95 per cent of the compensation insurance taken out. The rates are based on the actual statistics and experiences of these companies.

"Any plan of compensation for work accidents to prove effective and to truly fulfil what is expected of it must primarily be prophylactic; that is, it must lay less stress on compensation for, than prevention of, such work accidents. It is well known that only a limited number of industrial accidents can be prevented through mechanical safeguards. The vast majority of accidents are due to inherent recklessness in the individual workmen. The solution lies in *educating the rank and file of employees out of instinctive recklessness into intuitive caution.*

"Engineers, architects, and contractors should be particularly interested in this subject. In any phase of engineering endeavor, standardization is the road to success and that must be true in accident prevention. Uniform standards for safety are essential. The designing engineers of this country must in the future pay as much attention to the subject of safety as they have in the past paid to efficiency of their machines. Architects must as seriously consider and devote as much care to the safety of the occupants in the buildings they are constructing as they have in the past devoted to artistic appearances and conveniences.

The United States has become the greatest industrial and commercial nation on earth, but one of the fundamentals upon which we must build our future is that our industries and working establishments be made reasonably safe for the men and women who are to live in them during working hours. We must make it the duty of every foreman and superintendent not only to deliver the product of the plant to the world's market, but we must equally insist that he deliver the employees under him to their respective homes every evening without having been killed or maimed. We owe that to our wage

earnings from a humanitarian standpoint and we owe it to our nation as a whole from an economic standpoint."

The Basis of a Sickness Insurance Bill.

A year and a half ago the American Association for Labor Legislation announced a Committee on Social Insurance. Five months later it organized the first American Conference on Social Insurance, in Chicago, and with the published proceedings presented a convenient classified bibliography for the encouragement of students. At its annual meeting in Washington last December the association devoted half a day to the discussion of carefully prepared papers and reports on sickness insurance, believing it the most urgent of the problems in this field, now that much progress has been made toward compensation for industrial accidents.

Recently, after many conferences for discussion and revision of proposals, the committee has formulated a tentative statement of the essential lines which it purposes to follow in the drafting of a sickness insurance bill. In the hope that this statement may call forth helpful suggestions and be of substantial assistance in formulating legislative plans in the several states in which the subject has begun to receive attention, it is published below:

1. To be effective, sickness insurance should be compulsory, on the basis of joint contribution of employer and employee and the public.

2. The compulsory insurance should include all wage-workers earning less than a given annual sum, where employed with sufficient regularity to make it practicable to compute and collect assessments. Casual and home workers should, as far as practicable, be included within the plan and scope of the compulsory system.

3. There should be a voluntary supplementary system for groups of persons (wage-workers or others) who for practical reasons are kept out of the compulsory system.

4. Sickness insurance should provide for a specified period only, provisionally set at twenty-six weeks (one-half a year), but a system of invalidity insurance should be com-

bined with sickness insurance so that all disability due to disease will be taken care of in one law, although the funds should be separate.

5. Sickness insurance on the compulsory plan should be carried by mutual local funds jointly managed by employers and employees under public supervision. In large cities such locals may be organized by trades with a federated bureau for the medical relief. Establishment funds and existing mutual sick funds may be permitted to carry the insurance where their existence does not injure the local funds, but they must be under strict government supervision.

6. Invalidity insurance should be carried by funds covering a larger geographical area, comprising the districts of a number of local sickness insurance funds. The administration of the invalidity fund should be intimately associated with that of the local sickness funds, and on a representative basis.

7. Both sickness and invalidity insurance should include medical service, supplies, necessary nursing and hospital care. Such provision should be thoroughly adequate, but its organization may be left to the local societies under strict governmental control.

8. Cash benefits should be provided by both invalidity and sickness insurance for the insured or his dependents during such disability.

9. It is highly desirable that prevention be emphasized so that the introduction of a compulsory sickness and invalidity insurance system shall lead to a campaign of health conservation similar to the safety movement resulting from workmen's compensation.

The chairman of the Committee on Social Insurance is Edward T. Devine, and secretary John B. Andrews, secretary of the American Association for Labor Legislation.

The Survey, August 8.

Tuberculosis Among Metal Molders in Massachusetts.

In the July issue of the *Journal of the Massachusetts State Sanatoria* there is an instructive article by the editor relating to tuberculosis among iron molders in that state.

"The diseases to which molders are most

liable are rheumatism, pneumonia, kidney inflammations, bronchitis and consumption. In Massachusetts we have many metal-working establishments connected with which are foundries in which different metals are melted and molded. Thus we have iron foundries, brass foundries, composition metals foundries, silver foundries, electrotype foundries, etc.

"The molder's life while at work may truly be said to be one of risk to limb and hazard to health. In it he is exposed to the laborious nature of much of his work, to extreme heat, to gases created by the work, to metallic and mineral dusts, to such metallic poisons as lead, copper, zinc and antimony, the danger of burns from hot metal, to danger to eyesight and to the danger connected with stepping from a very hot foundry while overheated and tired by the day's work into a cold outside air.

"The iron molder spends his forenoon preparing his molds for the afternoon 'pouring' off. This latter process lasts from an hour to two hours or longer, and is the most strenuous and exhausting part of his work. Stripped to the waist, or else clothed as to his chest with a thin undershirt only, he hurries from the furnace or 'cupola' as it is called, in which the metal is melted and from which it is 'poured,' to the molds, carrying in an awkward position a long-handled iron ladle full of molten iron, the whole weighing about forty pounds. After pouring the metal into the molds he hurries back to the furnace for a fresh supply. The foundry at this time is very hot from the heat of the furnaces and of the metal in the molds. From many of the latter gases escape. The work is done with a rush and at the end of the pouring off the molder is much overheated and frequently is worked out. He hurries then to the wash room, where he strips and bathes under good or bad conditions as the case may be. Then he hurries into his street clothes and starts for home. In cold weather it is this sudden passing from a condition of overheating and profuse perspiration to a temperature from 60 to 90 degrees less than that of the foundry that tests the vitality of the molder and many times results in rheumatism, pneumonia or acute bronchitis which often be-

comes chronic and to which latter tuberculosis is sometimes secondary.

"The iron molder is also exposed to a considerable amount of dust from the sand used in the molds, and if he is also a polisher, as may be the case in small foundries, he is still further exposed to dust from emery and iron. Gases and smoke escaping from the molds at the time of pouring vitiate the foundry air.

"The iron molder pours once a day. The brass molder pours twice a day, once in the morning and once in the afternoon. The brass molder's work is on the whole not so strenuous as that of the iron molder, but he is exposed to dangerous influences which do not appear in iron molding. I mean the inhalation of fumes of molten copper, zinc and other metals. This exposure is most pronounced at the time of 'pouring off' for at this time the melting pots are open, the molten metal is ladled out and poured into the molds and the molders inhale large quantities of the fumes even in foundries in which the ventilation is helped by power fans and blowers. Most brass molders at some time in their working lives have what is known as 'brass foundry' ague, which is a sickness characterized by headache, vomiting and chills and which is the direct result of poisoning by the fumes of melted zinc. The effect of these poisonous fumes in the production of tuberculosis is a secondary effect, that is to say, the fumes themselves do not produce tuberculosis but do so weaken the vitality of the workers that they are rendered easier prey to the disease.

"Electrotype molders are exposed to the fumes of molten lead, antimony and tin, and these men occasionally show signs of chronic poisoning by lead or antimony.

"The chief factors then in the molder's life in connection with the development of tuberculosis are the exhausting nature of the work, the overheating and subsequent exposure while exhausted to cold out-door air, the exposure to dust and to gases and, as stated, the exposure of certain molders to the debilitating effects of the fumes of poisonous metals. And to these must be added that factor so common to all exhausting occupations, the abuse of alcohol, which appears to be almost a direct result of the nature of the work."

CURRENT PUBLIC HEALTH LITERATURE.

AMERICAN.

Journal of the American Medical Association, Chicago.

LXIII, No. 13. September 20.

Further Studies of the Thompson-McFadden Pellagra Commission. A Summary of the Second Progress Report. J. F. Siler, P. E. Garrison and W. J. McNeal.

Attempts to Transmit Pellagra to Monkeys. C. H. Lavinder, E. Francis, R. M. Grimm and W. F. Lorenz.

LXIII, No. 14. October 3.

Sporotrichosis in the Mississippi Basin. R. L. Sutton.

Pellagra in Minnesota. D. R. Brengle

The Duck as a Preventive against Malaria and Yellow Fever. S. G. Dixon.

LXIII, No. 15. October 10.

Beriberi. J. M. Little.

LXIII, No. 16. October 17.

The Relation of Heat to the Morbidity and Mortality of Infants from Gastro-Intestinal Diseases. H. F. Helmholz.

LXIII, No. 18. October 31.

Ninety-Three Persons Infected by a Typhoid Carrier at a Public Dinner. W. A. Sawyer.

The Necessity for Restriction and Control of Sewage Pollution of the Great Lakes System. A. J. McLaughlin.

The History of the First Milk Depot or Goulettes de Lait with Consultations in America. H. Koplik.

LXIII, No. 19. November 7.

The Education of Health Officers. M. P. Ravenel.

Test of Ventilating Plants. F. Bass.

The Importance of Studying the Actual Condition of Hospital Air. C.-E. A. Winslow.

Hospital Ventilation from the Point of View of the Clinician. J. A. Miller.

Laboratory Experiments with Air. F. S. Lee.

Hospital Ventilation from the Ventilating Engineer's Point of View. A. K. Ohmes.

The Faucial Tonsils as a Gateway to General Infections. N. L. Wilson.

LXIII, No. 20. November 14.

Present-Day Public Health Activities. F. E. Fronczak.

Disease and Poverty. J. N. Hurty.

Tuberculosis as a Cause and Result of Poverty. S. A. Knopf.

County Health Organization in the United States. L. I. Dublin.

LXIII, No. 21. November 21.

A Year's Experience with Contagious Disease Nurses. W. H. Price.

Morbidity Reports and Statistics—A Discussion of the Provisions of the Model State Law for the Report of the Controllable Diseases. J. W. Trask.

American Journal of Tropical Diseases and Preventive Medicine, New Orleans.

I, No. 12. June.

Educational Methods for Use in Anti-Malarial Work. H. R. Carter.

II, No. 3. September.

Ants and Bees as Carriers of Pathogenic Microorganisms. W. M. Wheeler.

An Epidemic of Malaria at Greenwich, Conn. F. C. Hyde.

II, No. 4. October.

Bubonic Plague—Study of Typical Case. H. W. Wade and H. L. Staring.

Archives of Internal Medicine, Chicago.

XIV, No. 3. September.

Second Progress of Thompson-McFadden Pellagra Commission. J. F. Siler, P. E. Garrison and W. J. McNeal.

Relation of Pellagra to Use of Certain Foods and to Location of Domiciles in Six Selected Industrial Communities. J. F. Siler, P. E. Garrison and W. J. McNeal.

XL, No. 4. October.

Relation of Methods of Disposal of Sewage to Spread of Pellagra. J. F. Siler, P. E. Garrison and W. J. McNeal.

Botulism—Food Poisoning Apparently Due to Eating of Canned String Beans. R. L. Wilbur and W. Ophuls.

Boston Medical and Surgical Journal.

CLXXI, No. 11. September 10.

Syphilis in Massachusetts. A. Post.

What the City should Do to Control Syphilis. T. B. Shea.

CLXXI, No. 15. October 8.

Epidemic of Paratyphoid at Boston State Hospital, 1910. M. M. Canavan.

Relation of Paratyphoid to Antityphoid Vaccination. M. M. Canavan.

CLXXI, No. 18. October 29.

Relation of Industry to General Medicine. D. L. Edsall.

Relation of Insurance Companies to Industrial Diseases. F. L. Hoffmann.

Occupational Diseases as Public Health Problem. H. Linenthal.

Engineering Record, New York.

LXX, No. 14. October 3.

Mount Gretna Sewage Plant. M. H. Matthes.

LXX, No. 16. October 17.

Electrolytic Sewage Treatment at Elmhurst. Limitations of Water Filters. G. W. Fuller.

Remodeling Septic Tank and Contact Filter Sewage Plant. A. Patten.

Controlling Discharge of Inflammable Wastes into Sewers. N. S. Sprague.
Experimental Sewage Treatment Plant in Brooklyn. G. T. Hammond.

LXX, No. 18. October 31.

Proposed Future Sanitary Policy of Racine, Wis.

LXX, No. 19. November 7.

Construction Plant for Cleveland Filters.
Common Deficiencies in Public Works Reports—How to Correct Them. A. N. Johnson.

Bulletin of Johns Hopkins Hospital, Baltimore.

XXV, No. 283. September.

Bacteria Found in Milk Heated to Various Temperatures. W. W. Ford and J. C. Pryor.
Presence of Spore-Bearing Bacteria in Washington Market Milk. J. C. Pryor.

Journal-Lancet, Minneapolis.

XXXIV, No. 20. October 15.

Public Health Legislative Campaign. H. W. Hill.

Journal of Infectious Diseases, Chicago.

XV, No. 2. September.

Tuberculocidal Action of Certain Chemical Disinfectants. L. M. DeWitt and H. Sherman.
Relative Longevity of Different Streptococci and Possible Errors in Isolation and Differentiation of Streptococci. W. L. Holman.
Infection of Man with Bacterium Tularensis. W. B. Wherry and B. H. Lamb.
Etiology of Dengue: Attempt to Produce Disease in Rhesus Monkey by Inoculation of Defibrinated Blood. C. H. Lavinder and E. Francis.
Treatment of Tetanus by Antitetanic Serum. E. E. Irons.
Growth and Viability of Streptococci of Bovine and Human Origin in Milk and Milk Products. D. J. Davis.

Journal of Outdoor Life, New York.

XI, No. 9. September.

Needs of Patients Discharged from Tuberculosis Sanatoria. C. F. Bolduan.
After Sanatorium—What? S. E. Goldstein.
Employment of Sanatorium Graduates. D. R. Lyman.

Public Health Reports, Washington.

XXIX, No. 39. September 25.

Morbidity Reports. Method of Securing and Recording in California.
Coöperative Public Health Administration—An Experiment in Small Communities.

XXIX, No. 40. October 2.

Public Health Administration in Minnesota.

XXIX, No. 41. October 9.

The Control of Communicable Diseases.
The Chemical Disinfection of Water.

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Drug Intoxication—An Economic Waste and a Menace to Public Health.

XXIX, No. 45. November 6.

The Friedmann Treatment for Tuberculosis.
Bacteriological Standard for Drinking Water—The Standard Adopted by the Treasury Department for Drinking Water Supplied to the Public by Common Carriers in Interstate Commerce.
Plague Prevention—Report of Work in Mobile, Ala., during August and September, 1914.

XXIX, No. 46. November 13.

Sale and Use of Poison.
The Sanitation of Iquitos, Peru.

FOREIGN.

British Medical Journal, London.

No. 2800. August 29.

Causes of Blindness in Eleven Hundred Children. N. B. Harmon.

Journal of State Medicine, London.

XXII, No. 9. September.

Thirty Years' History of Tetanus. L. Vaillard.
State Medicine Problems of Coming Ten Years. W. L. MacKewzie.
Value of Incubation Test in Examination of Water and Other Products. S. Delepine.

XXII, No. 10. October.

Medical Inspection in Relation to Special Schools. E. T. Roberts.
Medical Treatment of School Children in Rural Districts. A. E. Williams.
Training of Teachers in Hygiene. C. C. Douglas.

Public Health Journal, Toronto.

V, No. 8. August.

Public Abattoirs. J. T. J. Vallance.
Conditions Affecting Efficiency of Sewage Disposal Works in Canada. R. H. Murray.
Economics of Sewage Disposal. B. Patten.

Results of Mechanical Gravity Filtration at Saskatoon, Sask. G. B. Clark.
Legal Aspect of Sanitary Inspectors' Work. Engineer and Social Service. S. Parry.
How May Medical Health Officer Help Social Worker? J. H. T. Falk.

V, No. 8. September.

City Waste Disposal by Incineration. W. D. Tait.

V, No. 10. October.

Public Health and the General Practitioner. T. H. Whitelaw.
Standards with Reference to Sewage Treatment. J. Race.
Some Difficulties of Medical Officers of Health in Towns and Rural Communities. T. W. Varden.

Medizinische Klinik, Berlin.

X, No. 36. September 6.

Epidemics During War Time. K. Brandenburg.

Münchener Medizinische Wochenschrift.

LI, No. 35. September 1.

Industrial Poisoning in Manufacture of Fertilizer. F. Koelsch.
Distribution of Pseudo-Dysentery Bacilli. O. Mayer.



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